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NORTON SOUND - PORT CLARENCE - KOTZEBUE

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PRESENTATION

This report summarizes the 1998 season and historical information concerning management of the commercial and subsistence fisheries of the Norton Sound, Port Clarence and Kotzebue Sound districts. Data from special management and research projects are included in this report. A more complete documentation of project results will be presented in separate reports.

Data presented in this report supersedes information found in previous management reports. An attempt has been made to correct errors presented in earlier reports. Previously unreported data has been included and is indicated by appropriate footnotes. Current year catch data presented has been derived from seasonal field data.

This report is organized into the following major sections:

(1) Salmon
(2) Herring
(3) King Crab
(4) Miscellaneous species

In order to facilitate use of this report, tabular data has been separated into two categories: 1) tables presenting annual data; 2) appendix tables which present historic comparisons.

SECTION 1: SALMON
(Includes Norton Sound, Port Clarence
and Kotzebue Districts)

SECTION 1 - SALMON

INTRODUCTION

Boundaries

The Norton Sound, Port Clarence and Kotzebue Sound salmon management districts include all waters from Point Romanof in southern Norton Sound to Point Hope and includes St. Lawrence Island. These management districts comprise over 65,000 square miles, with a coastline exceeding that of California, Oregon, and Washington combined.

Salmon Resources

Five species of Pacific salmon are indigenous to the area with chum *(Oncorhynchus keta)* and pink salmon *(O. gorbuscha)* historically being the most abundant. Chum, pink, and chinook (king) salmon *(O. tschawytscha)* have been found as far north as Barrow; however, these species are uncommon north of the Kotzebue Sound drainages. The northernmost large concentrations of chum salmon are found within the Kotzebue Sound drainages, while large numbers of pink, chinook and coho *(O. kisutch)* salmon are not found north of Norton Sound. Small sockeye (red) salmon *(O. nerka)* populations exist within a few Seward Peninsula drainages.

Commercial Fishery

In 1959 and 1960, Department biologists conducted resource inventories which indicated harvestable surpluses of salmon available in several rivers systems of the Norton Sound-Arctic area. The Department liberalized various regulations and encouraged processors to explore and develop new fishing grounds. As a result, commercial salmon fishing activity has grown significantly since statehood, enabling some local residents to obtain cash income.

The majority of commercial fishermen and many buying station workers are resident Native Alaskans (Yupik, Inupiat, Siberian Yupik from St. Lawrence Island). Commercial fishermen operate set gillnets from outboard powered skiffs to capture salmon. All commercial salmon fishing is done in coastal marine waters.

Salmon effort and catch per unit effort data (CPUE) presented throughout this section have been derived as follows. Boat (or fisherman) hours have been computed after assuming that if a fishing boat delivers during a fishing period, it fished the entire period. The total number of individual boats delivering in any period is multiplied by the number of hours open to commercial fishing. Catch per fisherman (or boat) hour is obtained by dividing the

total fishermen hours into the catch for the corresponding period of time. Total fishermen (or boats) is the total number of fishermen making deliveries, regardless of how many deliveries were made or days fished during a particular period or season. There are a number of fishermen who deliver only once or twice during the entire season. Total days fished is the total number of hours open to commercial fishing during the season divided by 24 hours.

Subsistence Fishery

There are approximately 16,000 people in the area, the majority of whom are Native Alaskans, residing in more than 26 small villages scattered along the coast and the major river systems. Nearly all of the local residents are dependent to varying degrees on the fish and game resources for their livelihood.

Subsistence fishermen operate gillnets or seines in the main rivers and, to a lesser extent, in the coastal marine waters capturing primarily salmon, whitefish, arctic char and inconnu (sheefish). Beach seines are used near the spawning grounds to catch schooling or spawning salmon and other species of fish. The major portion of fish taken during the summer months is air dried or smoked for later consumption by villagers or occasionally their dogs.

Prior to 1960, subsistence harvest information is incomplete or entirely lacking. From the early 1960s until 1982, the Department conducted annual household surveys in communities with major salmon fisheries. Beginning in 1983, budgetary restrictions made it impossible to conduct surveys in each village. For the last 5 years that these surveys were conducted for Norton Sound (1978-1982) the average subsistence catch was 73,000 salmon including all species (Appendix Table A8). The majority of salmon taken are pinks and chums.

Subsistence surveys for the Kotzebue area were less complete. An expansion of documented surveys from several years for different villages estimates total subsistence salmon harvest for the Kotzebue Sound area to approach 75,000 (Appendix Table C6).

Since 1974, subsistence salmon catches in the Nome Subdistrict (Subdistrict 1) have been determined from the return of catch calendars as required under a permit system. Not all fishermen were contacted, and the data were not expanded therefore these harvests should be considered minimum figures.

In 1994, the Department initiated a new annual subsistence salmon harvest assessment effort in northwest Alaska which provided more extensive, complete, and reliable salmon harvest estimates than existed previously. In 1998, the department continued its subsistence salmon harvest assessment program. Household surveys were conducted in 10 communities in the Norton Sound District, both communities in the Port Clarence District, and six of the 15 Kotzebue District communities. In Kotzebue, subsistence salmon harvests

were determined through a postcard survey and in the Nome area, harvests were determined through fishing permits and catch calendars. In the 18 surveyed communities, surveyors attempted to contact 100 percent of the households, with an actual contact rate of 88.7 percent in 1998. The harvest data were expanded to account for those households not contacted.

The goals of the post-season household survey were to:

1) collect harvest data that would result in a total harvest estimate for subsistence salmon by species and community,
2) compile information on gear types, participation rates, sharing, use of salmon for dog food, and household size, and
3) update household lists and identify subsistence fishing households. Researchers interviewed households with the use of a two-page survey instrument (Appendices G5-G7).

Management

The Division of Commercial Fisheries of the Alaska Department of Fish and Game is responsible for the management of commercial and subsistence fisheries in this vast area. The permanent full-time staff assigned to this area during 1998 consisted of the Area management Biologist stationed in Nome, the Assistant Area Biologist and an Area Fish Culturist stationed in Nome, an Assistant Management Biologist in Kotzebue, and an Administrative Clerk assigned to the Nome office. In addition, seasonal assistance in conducting various management and research activities was provided by approximately 20 seasonal biologists and technicians in Norton Sound and Kotzebue Sound. Additional assistance was provided by biologists from the regional staff. In 1998, interns funded by Norton Sound Economic Development Corporation were utilized as fisheries technicians in some projects. Four cooperative projects staffed by Kawerak Inc. in Norton Sound supplement the salmon escapement monitoring activities of the area staff.

The main objective of the Department's program is to manage the commercial and subsistence salmon fisheries on a sustained yield basis. Various field projects are conducted to provide information on salmon abundance, migration and stock composition. Summaries of ADF&G and Kawerak Inc. projects are presented in Appendix G2.

Management of the salmon fishery is complicated by the difficulty in obtaining valid escapement data in this large area and by insufficient comparative catch and return information. Management problems are compounded by the need to provide not only for adequate escapements, but for the needs of several different user groups. Alaska state law requires that subsistence uses receive a priority over other uses of fish and wildlife resources. If the subsistence harvest or demands increase, commercial fishing may be restricted. It should be pointed out that increases in commercial fishing efficiency are expected and may balance any immediate decline in subsistence utilization or increase in

run size with the result that present regulations have been maintained or made even more restrictive.

The basic regulation that governs the commercial salmon harvest in all districts is the scheduled weekly fishing period. Commercial fishing regulations provide for a total of two to four days of fishing per week during the open season depending on area and season. The Department attempts to distribute fishing effort throughout the entire return to avoid harvesting only particular segments of the return. Occasionally, fishing time is increased or decreased by Emergency Order, depending upon fishing conditions and the strength of the returns or spawning escapements, as determined by special studies conducted by the Department. Emergency Orders issued during the 1998 seasons are presented in Appendix G3.

Weekly fishery reports, which give information on fishery status and fishing schedules, are broadcast during the fishing season over radio KICY and KNOM in Nome, and KOTZ in Kotzebue. In addition, fishery news articles are published in the Nome Nugget, Bering Strait Record, and the Arctic Sounder.

NORTON SOUND DISTRICT

District Boundaries

The Norton Sound Salmon District consists of all waters between Cape Douglas in the north and Point Romanof Light in the south. The District is divided into six subdistricts: Subdistrict 1, Nome; Subdistrict 2, Golovin; Subdistrict 3, Moses Point; Subdistrict 4, Norton Bay; Subdistrict 5, Shaktoolik; and Subdistrict 6, Unalakleet Subdistrict (Figure 1). Each of these subdistricts contains at least one major salmon-producing stream. Subdistrict boundaries were established to facilitate management of individual salmon stocks.

All commercial salmon fishing in the district is by set gillnets in marine waters; fishing effort is usually concentrated near river mouths. Commercial fishing typically begins in June and targets chinook salmon. Emphasis switches to chum salmon around June 25 and the coho salmon fishery begins the third week of July. The season closes September 7. Pink salmon may be very abundant on even year returns and a pink directed fishery may replace or may be scheduled to alternate periods with the historical chum directed fishery.

Salmon management has changed significantly during recent years due to limited market conditions and marginal returns of many salmon stocks within the district. The Eastern subdistricts, Norton Bay, Shaktoolik, and Unalakleet all have fairly healthy salmon stocks. Commercial fishing in these subdistricts is managed using commercial fishing statistics and the Unalakleet River test fishing escapement index. Both the Golovin and Moses Point Subdistricts have recently suffered from poor chum salmon returns. In these two subdistricts, management first insures an adequate escapement, then a subsistence harvest

within historical levels and finally an attempt is made to provide for a commercial and sport harvest. The Nome Subdistrict is managed intensively for subsistence use. Registration permits, closed waters, setting fishing period length, limiting gear and harvest limits are all tools that can be employed throughout the season to provide for escapement needs and to maximize subsistence opportunity.

Historical Fishery Use

Fishing has been a part of life for Norton Sound residents for many centuries as indicated by archeological evidence dating back 2,000 years (Bockstoce, 1979). The largest pre-contact settlements on the Bering Strait Islands and the Western Seward Peninsula were located where marine mammals were the primary subsistence resource. The rest of the region's population lived in small groups scattered along the coast, often moving on a seasonal basis to access fish and wildlife resources (Thomas 1982). During summer months residents would disperse, usually in groups comprised of one or two families, and set up camps near the mouths of streams. Harvest levels of fish on any one stream were relatively small because of the low concentrations of people who caught only what their families and one or two dogs needed through the winter (Thomas 1982).

A large scale fur trade was developed by the Russians in the late 1800's and continued after the American purchase (Magdanz 1981). The activities and support for hundreds of commercial whalers and trading ships caused trading to increase in the region around 1848 (Ray 1975). The increased competition for walrus, caribou, and other species from outsiders may have increased the importance of salmon to area residents (Magdanz 1981). In the late 1890's gold was discovered on the Seward Peninsula and boom-towns sprang up with thousands of new immigrants flocking to the region. Commerce developed which drew people to central locations that evolved into year-round communities. Other reasons for communities to become established stemmed from the operation of missions.

The impact of mining was significant on fish populations. Nearly every stream on the Seward Peninsula had some sort of mining operation working on it which ranged from simple gold panning to sluice boxes to hydraulic giants to bucket line dredges. One example of extensive impact was on the Solomon River, which is only 30 miles long but had 13 dredges working at one time. Another obvious impact was simply the large number of people who came to live in the region between 1900 and 1930. Communities like Nome, with a population of 30,000 and Council with 10,000 people at one time, did not exist before gold was discovered.

It was in the late 19th century when the size of the dog teams increased from two or three to as many as ten to twenty. At about the same time, wooden boats began to replace kayaks (Thomas 1982). Consequently, the demand for dry fish to feed the dog teams increased along with the development of better means to harvest fish. Winter transportation throughout the region was done with hired dog teams and drivers who carried mail or freight along the coast and across the state to the ice-free port at Seward. Dry fish became a

major barter item in response to the great demand for dog food, which consisted of primarily chum and pink salmon (Thomas 1982).

Local residents would spend most of their summers catching and drying large amounts of salmon, some of which they kept for themselves and the rest would be bartered or sold to mining camps, roadhouses, and trading posts or stores. For example, the Haycock mining camp on the Koyuk River would buy about two tons of dry fish each year. There were roadhouses at Golovin, Walla, Moses Point, Isaac's Point, Ungalik, Robertvale, foothills (south of Shaktoolik), Egavik, and many other locations. Dry fish was bought in units of bundles (50 dry fish tied together) at a typical price of 10 cents per pound from the fishermen. One elder in the area felt that more fish were retained for their own use as compared to the amount sold which may have averaged five to ten bundles per household (Thomas 1982).

After the gold rush the number of people gradually decreased over the next twenty years as the gold deposits were worked out. The number of dog teams diminished by the mid 1930's with the introduction of the mail plane and mechanical tractors. The last mail team contract ended in 1962 at Savoonga. Local stores continued to trade in dry fish at Shaktoolik, Saint Michael, Unalakleet, and Golovin. An example of quantity was the Shaktoolik store that had a cache 8x20x40 feet which would be filled to the top with dry fish. One elder said the stores would buy the fish for 6 cents a pound and sell them for 10 cents a pound or their equivalent in groceries and supplies (Thomas 1982). By the early 1960's, commercial salmon fishing developed into a source of summer cash and snowmachines were replacing the need for dog teams (Thomas 1982). Dry fish was no longer needed to feed dogs and cash was becoming more available for trading at stores.

Commercial Fishery Overview

Commercial salmon fishing in this district first began in the Unalakleet and Shaktoolik Subdistricts in 1961. Most of the early interest involved chinook and coho salmon that were flown in dressed condition to Anchorage for further processing. A single U.S. freezer ship also purchased and processed chum and pink salmon during 1961. In 1962, two floating cannery ships operated in the district and the commercial fishery was extended into the Norton Bay, Moses Point and Golovin Bay Subdistricts. The peak in salmon canning operations occurred during 1963.

Since then, markets have been sporadic and some subdistricts have often been unable to attract buyers for entire seasons. A joint venture between KEG (Koyuk-Elim-Golovin) Fisheries and NPL Alaska, Inc., operated from 1984 until mid-season in 1988. A permit issued by the Governor allowed two Japanese freezer ships to buy directly from domestic fishermen and was limited to salmon caught in the internal waters of Golovin and Norton Bays. Currently, the most consistent markets are at Unalakleet and Shaktoolik where fish are purchased, iced, and flown directly to Anchorage for processing and resale.

The commercial salmon fishing season opens by emergency order between June 8 and July 1, depending on run timing within each subdistrict. The season closes by regulation on August 31 in Subdistricts 1, 2, and 3, and on September 7 in Subdistricts 4, 5, and 6, but processors often terminate their operations prior to the regulatory closure dates. Two 48-hour fishing periods normally occur each week unless changed by emergency order with the exception of the Nome and Moses Point Subdistricts, where two 24-hour fishing periods are scheduled each week.

Commercial fishing gear is restricted to set gillnets, with a maximum aggregate length of 100 fathoms allowed for each fisherman. There are no mesh size or depth restrictions during the normally scheduled periods. However, mesh size is often restricted in an attempt to harvest a specific species of salmon. The majority of the gillnets fished are approximately 5 3/4 inch stretched measure. In the Unalakleet and Shaktoolik Subdistricts, 8 1/4 inch stretched mesh gillnets are commonly used during the chinook salmon run in June through early July. During years when large pink salmon runs occur, the Department provides fishing periods when only 4 1/2 inch mesh nets or less may be set or drifted. These special small mesh periods are an attempt to target pink salmon without over harvesting the larger sized salmon species.

Most fishermen do not tend their nets continuously once they are set, leaving them unattended overnight. Fish quality suffers due to the length of time fish may be left in the nets and is especially poor when storms prevent fishermen from checking their gear for extended periods of time.

Commercial Fishery Management

The Norton Sound District is managed on the basis of comparative commercial catch data, escapements and weather conditions. A single factor or combination of factors may result in issuance of emergency orders affecting seasons, fishing periods, allowable mesh size, and areas.

Aerial surveys are used to monitor escapements in the majority of the Norton Sound streams. Weather conditions, time of day, type of aircraft, water conditions, bottom conditions, date of survey, and efficiency of the surveyor and pilot must be taken into account when making inter-annual aerial survey comparisons. Counting towers are a much more consistent and accurate method of obtaining escapement information and have been utilized on many river systems in Norton Sound. Seven counting towers were operated in 1998.

The Commercial fishing season begins with chinook salmon in mid June. Emphasis switches to chum salmon around June 25, then gradually shifts to coho during the third week in July. Pink salmon are abundant during even years, but there is often no market for this species. The southern Subdistricts 5 and 6 (Shaktoolik and Unalakleet) have maintained commercial fisheries. They target chinook, chum, and coho salmon, with

chinook and coho salmon catches remaining fairly stable while chum salmon catches have been declining since the early 1980's. Management has consisted of a series of Emergency Orders that open and close fishing, adjust fishing time, and restrict mesh size, a fishing period.

Commercial fisheries in Subdistricts 2 and 3 (Golovin and Moses Point) target chum salmon. The commercial chum salmon harvest has dropped dramatically since the mid 1980's. Poor returns have resulted in restrictive management actions during recent years when the seasons have been closed by E.O. to allow for escapement and subsistence needs.

There has been little or no commercial salmon harvests in Subdistricts 1 and 4 (Nome and Koyuk) since the early 1980's. In the Nome Subdistrict this is due to very depressed stocks which in some years require closure or severe restrictions on the fishery. Conversely, the Norton Bay Subdistrict has healthy stocks, but can't attract markets willing to operate in this remote area.

Salmon management has changed significantly during recent years due to limited market conditions and marginal returns of many salmon stocks within the district. The Eastern subdistricts, Norton Bay, Shaktoolik, and Unalakleet all have relatively healthy salmon stocks. Commercial fishing in these subdistricts is managed using commercial fishing statistics and the Unalakleet River test fishing escapement index. Both the Golovin and Moses Point Subdistricts have recently suffered from poor chum salmon returns. In these two subdistricts, management first insures an adequate escapement, then a subsistence harvest within historical levels and finally an attempt is made to provide for a commercial and sport harvest. The Nome Subdistrict is managed intensively for subsistence use. Registration permits, closed waters, setting fishing period length, limiting gear and harvest limits are all tools that can be employed throughout the season to provide for escapement needs and to maximize subsistence opportunity.

Subsistence Fishery Overview

Due to budgetary restrictions, household subsistence harvest surveys were not conducted district wide in Norton Sound from 1985 to 1993. Since 1994, the department has conducted an annual subsistence salmon harvest assessment effort in northwest Alaska which provided more extensive, complete, and reliable salmon harvest estimates than previously existed. These household subsistence harvest surveys are primarily funded by the Commercial Fisheries Management and Development Division and were conducted by the Division of Subsistence during the fall in 10 Norton Sound villages. For the second time, the St. Lawrence Island communities of Gambell and Savoonga were included in the Norton Sound District surveys. Subsistence harvest estimates for the district are generated from the data gathered by the survey project.

Daily surveys of Unalakleet River and ocean subsistence fishermen have been conducted annually since 1985 during the chinook salmon run. Although total harvests by subsistence

fishers were not documented, effort and catch information was used to judge timing and magnitude of the chinook salmon return. The commercial fishery is delayed until it becomes apparent subsistence needs are being met and chinook salmon are beginning their upstream migration as indicated by the Department of Fish and Game test net in the lower Unalakleet River. There is a growing trend to move subsistence nets from the river mouth out to the ocean in order to avoid large debris loads from spring runoff. It is presently unclear what changes this fishing technique will have on chinook salmon escapement.

Low salmon stock levels in the Nome Subdistrict combined with a large concentration of users has required issuing subsistence harvest permits for the area since 1974. These are issued by regulation to each household and designated fishing location. Each location may have its own catch limit per permit and the fisherman is allowed to change locations after notifying the local Fish and Game office. After the fishing season, households must return the completed calendar to the department, whether or not they actually fished.

Regulatory Actions in Nome Subdistrict

Although pink salmon are usually the most abundant species of salmon in Subdistrict 1 streams, the commercial fishery has primarily targeted chum salmon During the 1970's. The relatively large chum salmon catches in this subdistrict in conjunction with weak local abundance implied that the fishery intercepts non-local stocks. A 1978-79 Norton Sound stock separation study confirmed this view. Salmon tagged near Nome were re-captured in fisheries from Golovin (Subdistrict 2) to Kotzebue. In an attempt to provide for spawning requirements in addition to an important subsistence fishery that targets local stocks, a commercial harvest guideline of 5,000-15,000 chum salmon was adopted as a regulation.

Due to poor chum salmon escapement during the 1982 and 1983 seasons, the Board of Fisheries, in response to an advisory committee petition, directed the Department to manage the commercial fishery so that chum salmon escapement could be optimized. During the 1984 fall Board of Fisheries meetings, these directives which had been in practice that season became regulation. In response to public and advisory board proposals, the following commercial fishery restrictions were adopted as regulations:

1) Salmon may be taken commercially only from July 1 through August 31.

2) Fishing periods were restricted to two 24-hour periods per week.

3) Waters west of Cape Nome were closed to commercial salmon fishing to allow for rebuilding of the river stock that supported the historic subsistence effort.

The Department was also directed to allow a harvest at the lower end of the guideline harvest range of 5,000 to 15,000 chum salmon, as stipulated in 5AAC 04.360.

In addition to these commercial fishing restrictions, a proposal to restrict the sport fishery in the Nome and Snake Rivers was adopted in 1984:

> With a bag and possession limit of 15 salmon, other than chinook salmon, only 5 could be chum and coho salmon, in combination.

Subsistence permit limits in the Nome and Snake Rivers were restricted to 20 chum and 20 coho salmon. The remainder of the permit limit could be filled with salmon other than chum or coho salmon.

However, even with these restrictive regulations in place, chum salmon escapement goals were difficult to attain. The 1987 fishing season experienced poor returns of both chum and pink salmon to Nome Subdistrict streams. Numerous management actions were made which curtailed commercial fishing activities, and later, sport, personal use, and subsistence were also restricted. Even with such drastic fishery restrictions, escapement goals for chum salmon were not attained during 1987 in the Nome, Eldorado, Flambeau, Bonanza, Snake, and Solomon Rivers. In response to this continuing trend of decreasing chum and pink salmon returns to the Nome Subdistrict, several new regulations were adopted during the 1987 Alaska Board of Fisheries meetings.

At that time with the commercial fishery all but eliminated, proposals affecting the sport, personal use, and subsistence fisheries were considered. The following new sport fish regulations were adopted for all Nome area road system streams (Seward Peninsula drainages from Cape Prince of Wales to Cape Darby):

1) For salmon other than chinook, 10 per day, 10 in possession, only 3 which may be chum salmon and coho salmon, in combination.

2) For chinook salmon, 1 per day, 1 in possession.

These new regulations superseded those adopted during 1984. Additional new regulations affecting personal use and subsistence fishermen which were adopted in 1987 included:

1) In the Nome River, no person may operate more than 50 feet of gillnet in the aggregate.

2) The Nome River was added to the regulation 5AAC 01.170 (e) which states that small mesh gillnets (less than 4 ½ inch mesh) and beach seines may not be used in specific Nome Subdistrict streams.

Regulation changes in 1992 restricted the use of beach seines in the Nome subdistrict. The managers were given the authority to allow the subsistence harvest of chum or pink salmon by beach seine if escapement needs were likely to be met. Beginning in 1991, no chum salmon harvests were allowed until escapement goals were likely to be met or conservative management actions were judged to be no longer effective. In the past, beach seines were

viewed as an overly effective means to harvest fish, but during the last two years, beach seines were used as a means to harvest abundant species, while allowing the live release of other species experiencing depressed runs.

1998 Norton Sound Salmon Fishery

Commercial Fishery Overview

The 1998 Norton Sound District commercial salmon fishing season began on June 15 and ended on September 5. Commercial fishing time and areas were set throughout the season by Emergency Order. The commercial salmon harvest totaled 641,396 fish, which was comprised of 7,429 chinook, 7 sockeye, 29,623 coho, 588,013 pink, and 16,324 chum salmon (Table 1). Eighty-two permit holders participated in the fishery and received $358,982 for their catch (Table 2 and 3). This summary should be considered preliminary and will be updated with additions and corrections in subsequent reports.

Table 1 lists the Norton Sound salmon historical and current year commercial harvests relative to the recent 5 year (1993-1997) and the recent 10 year (1988-1997) averages. The total chinook salmon harvest for 1998 was considered average. The harvest was 9% below the recent 5 year average and 6% above the recent 10 year average. The coho salmon harvest was the lowest since 1987 at 50% below the recent 5 year average and 51% below the recent 10 year average catches. Although market was limited in some subdistricts, poor whether was the primary limiting factor for the low coho salmon harvest. Historically, Norton Sound has had very limited, but sporadic markets for pink salmon. Significant market interest began in 1994 that focused on the abundant even year return. The fishery went well so it was attempted on the weaker return in 1995 with such poor results that no directed pink fishery was attempted on the anticipated weak 1997 return. The commercial harvest of pink salmon was successful in 1996 and opened again in 1998. The 1998 harvest of pink salmon was larger than 1996, but less than 1994. The chum salmon commercial harvest was 49% below the 5 year average and 70% below the 10 year average catches for Norton Sound. This low chum salmon harvest can be attributed primarily to the combination of a low harvestable surplus and poor markets throughout the district.

The Norton Sound Salmon District has 201 CFEC salmon permits, with a record low of 82 permits actually fished during the 1998 season (Table 11). The number of participating fishermen this season was 27% below the recent 5 year average and 31% below the recent 10 year average. There has been a significant drop in effort in recent years due primarily to poor market conditions

Two primary salmon buyers co-operated in Norton Sound during the 1998 season. One buyer operated during the chinook and coho salmon seasons while the other buyer was interested in pink salmon. Both buyers shared use of the tenders and incidental catches of other species during pink salmon openings were delivered to the other buyer. The chinook and coho salmon were delivered to a land-based facility at Unalakleet from other

subdistricts using tenders and aircraft. Most fish were headed, gutted, iced and shipped airfreight to markets. Some salmon were frozen and shipped to Western Alaska villages as part of the State's disaster relief program. The other buyer, who purchased pink salmon, tendered fish throughout Norton Sound to their processing vessel located along the eastern coast. These salmon were filleted and frozen in blocks that were stored on-board the ship. In addition, a few individual fishermen sold their catch of fresh salmon locally and to wholesale distributors, as permitted under catcher-seller status.

The average price paid for chinook salmon was $.74 per pound, $.30/lb for sockeye, $.29/lb for coho, $.14/lb for pink, and $.09/lb for chum salmon (Appendix Table A10). The total value of the raw fish reported on fish tickets in 1998 was $358,982. This was 20% below the recent 5 year average and 23% below the recent 10 year average. The recent decline in traditional salmon markets has been offset in Norton Sound with the development of a pink salmon market on even year returns. The pink salmon harvest contributed 52% of the fishery value in 1998 at the dock.

Subsistence Fishery Summary

The department documented the 1998 subsistence salmon harvests in Norton Sound using two methods: 1) post-season household surveys were conducted in Golovin, White Mountain, Elim, Koyuk, Shaktoolik, Unalakleet, St. Michael, Stebbins, Savoonga and Gambell, and 2) subsistence fishing permits in the Nome Subdistrict and the Salmon Lake-Pilgrim River drainage. Council, a seasonal community on the Niukluk River, had no year-round residents in 1998 and was not surveyed. However, an unknown amount of subsistence salmon fishing occurs at Council by Nome residents that is not documented by household surveys or permits. An unknown amount of subsistence salmon fishing by Nome residents also occurs at Woolley Lagoon.

The subsistence harvest in the Norton Sound District in 1998 was 100,480 fish (Table 8). Of the total salmon harvest, 8.3 percent were chinook, 19.9 percent were chum, 51.7 percent were pink salmon, 1.2 percent were sockeye, and 18.9 percent were coho. This harvest was 23% greater than the 1997 harvest but less than the annual subsistence salmon harvests in the district 1994-96. A combination of week coho and chum salmon returns, and poor weather during the fishing season contributed to the low harvest in 1998. Nome area permit information and Norton Sound subsistence harvests by community can be found in Table 2 and Table 8.

The estimated mean salmon harvest was 85 salmon per household in the Norton Sound District. This includes 7 chinook, 17 chum, 44 pink, 1 sockeye, and 16 coho. Subdistrict 5 (Shaktoolik) accounted for the largest mean household harvest of salmon, an estimated 193 fish. The mean household harvests in the other subdistricts were 66 salmon in Subdistrict 1 (Nome), 146 salmon in Subdistrict 2 (Golovin and White Mountain), 139 salmon in Subdistrict 3 (Elim), 125 salmon in Subdistrict 4 (Koyuk), 126 salmon in Subdistrict 6 (Unalakleet), 81 salmon in southern Norton Sound (St. Michael and Stebbins), and 11 salmon at St. Lawrence Island.

In the Norton Sound District, 58 percent of the households subsistence fished for salmon and an additional seven percent assisted other households in processing subsistence-caught salmon. One percent of the subsistence salmon harvest was used for dog food. Rod and reel was used by about 71 percent of households to harvest salmon, while 49 percent of households used gill nets, 13 percent used seines, and 2 percent used drift nets, and less than 1 percent of households used dip nets. Although rod and reel was the most widely used gear type, it accounted for only 13 percent of the total salmon harvest. Coho salmon was the primary target of rod and reel fishing.

In the Norton Sound District, 58 percent of the fishing households responded that there subsistence chum salmon fishing was "poor", 32 percent responded "average", and 11 percent responded "very good". Poor chum salmon returns and wet weather during the fishing season contributed to a relatively poor subsistence chum salmon season in the Norton Sound District in 1998 (Georgette and Utermohle, 1998).

Season Summary by Subdistrict

Nome - Subdistrict 1. The commercial salmon season in the Nome Subdistrict is scheduled to take place by regulation between July 1 and August 31. However, there was no commercial salmon harvest due to inadequate surpluses of chum, pink, and coho salmon. Commercial fishing in the subdistrict is typically very limited because of the small local salmon stocks and the high subsistence demand. Sport fishing for chum salmon is closed by regulation in the subdistrict. The recent ten year average commercial harvest is 1 chinook, 1 sockeye, 202 coho, 50 pink, and 332 chum salmon. The ten year average subsistence salmon harvest in the subdistrict is 53 chinook, 164 sockeye, 1,162 coho, 2,687 pink, and 3,711 chum salmon. One hundred fifty two subsistence fishing permits were issued in 1998 for the Nome Subdistrict.

Subsistence fishing was closed prior to the beginning of the chum salmon return for nearly the entire area except in marine waters East of Cape Nome. A strong pink salmon return developed while chum salmon remained weak throughout most of the subdistrict. The management strategy used this season was to direct fishing effort as much as possible on the abundant pink salmon return while managing conservatively to assure chum salmon escapement. A series of Emergency Orders were issued that restricted fishing gear, times, and harvest areas to target pink salmon and protect chum salmon. Fishing gear restrictions, imposed alone or in combination, included gillnets with maximum mesh sizes of 4 ½ inches and beach seines that required releasing all chum salmon. In addition, the December Board of Fish meeting removed the Eldorado River from the "Rivers of Concern" list for chum salmon. This meant that management could be less restrictive than in the recent past for that stream. In a practical sense, subsistence chum salmon fishing could be justified once management became confident that escapement would be achieved rather than requiring escapement be attained before fishing is allowed. The problem in the past was that by the

time escapements had absolutely been reached the runs were often over and resulted in little opportunity to fish.

On June 29, the marine waters west of Cape Nome were opened to gillnets with a restricted mesh size of 4 ½ inches to target the abundant pink salmon while protecting chum salmon in the western coastal waters. The pink salmon return continued to build throughout the Nome area. On July 9, the marine waters of Safety Sound and Bonanza Channel were opened to gillnet fishing with the small mesh size restriction. Also, that day, seining was opened for the Flambeau, Eldorado, Bonanza, Solomon, Nome, Cripple, and Sinuk Rivers with the condition that all chum salmon were to be released. Subsistence gillnet fishing was opened without mesh restrictions for the Snake River on July 22nd because both aerial surveys and the counting tower indicated the chum salmon escapement goal had been attained. On July 30th, all rivers east of Cape Nome were opened to gillnets with unrestricted mesh size because the coho salmon return was developing and continued restrictions would do little to benefit chum salmon. Finally, all remaining waters in the subdistrict, rivers west of Cape Nome, were opened to unrestricted mesh size gillnets on August 3rd.

The coho salmon return appeared slightly below average, but fall storms and unusually high water stifled subsistence fishing efforts. Therefore, the standard subsistence fishing schedule of two 48 hour periods per week in freshwater and one 5 day period per week in marine waters was followed. It was felt that the reduced effort and success due to weather would offset the weak coho salmon returns and should result in adequate coho salmon escapements.

Golovin Bay-Subdistrict 2. Over the past eight years, chum salmon stocks in the Golovin Bay Subdistrict have received little or no commercial exploitation, yet seldom did they exceed spawning escapement goals. The current The 1998 Salmon Management Plan informed fishermen that the Golovin Bay Subdistrict commercial harvest would be limited to a maximum of 15,000 chum salmon before mid-July in an attempt to protect the chum salmon stocks and allow for a harvest while flesh quality is at its best. By that date, the chum salmon run would be assessed and fishing time would be adjusted accordingly.

No directed commercial chum salmon periods were opened during the 1998 season due to lack of market interest though the chum salmon return appeared adequate to support a limited commercial harvest. The pink salmon return was strong, but initially there was also little interest. Only a few permit holders had the equipment and resources to target pink salmon. Initially, the only pink salmon buyer in the area decided that it would not be profitable to send a tender to the Golovin Bay Subdistrict given the expected low volume of pink salmon available. However, later in the pink salmon run, some fishermen became interested in the Golovin Bay Subdistrict when the buyer began closing operations in the southern subdistricts and moved northward as the pink abundance diminished in the south.

The Golovin Bay Subdistrict began fishing on July 18 with gillnets restricted to pink gear only (Table 4). Continuous open fishing through July 31 was allowed. This was done

because: (1) there was an obvious abundant pink salmon return; (2) catches with the same gear restrictions in other subdistricts landed few chum salmon; (3) there was a market for both chum and pink salmon; (4) and the buyer requested that he be able to direct fishing times to optimize his tender and processing operations. Two additional 24 hour periods were scheduled for one fisherman who hoped to acquire salmon to be used as crab bait, but no commercial harvests were reported from those periods. On August 17, the subdistrict was opened on a continuous schedule through August 31 in preparation for a potential coho salmon market. However, there were never long enough breaks in the severe weather conditions to allow successful fishing and tendering. The total season commercial harvest landed by 16 permits holders included 1 chinook, 0 sockeye, 3 coho, 723 chum, and 106,761 pink salmon. The coho and chum salmon catches were below average, but the pink salmon harvest was the highest on record for the subdistrict.

Moses Point-Subdistrict 3. The Moses Point Subdistrict chum salmon return has also been experiencing below average returns despite conservative management actions. However, the situation has improved slightly as indicated by the Kwiniuk River tower counts which have been at or above the escapement goal in the last four years. As a result, the river has been removed from the "Rivers of Concern" list. The 1998 Salmon Management Plan stated that there was to be no chum salmon directed fishery. Fishing periods could be scheduled for other salmon species utilizing special restrictions to minimize the incidental chum salmon harvest. It was expected that this harvest would not significantly affect the subdistricts' chum salmon escapement.

A single 24 hour commercial chinook salmon fishing period was opened on June 18 in the Moses Point Subdistrict. The catch rate was low and the Kwiniuk River counting tower indicated the chinook salmon escapement was below average. Therefore, no additional chinook salmon directed periods were scheduled (Table 5).

The pink salmon return was strong as expected. A pink directed fishery opened June 30 and was scheduled to run continuously through July 25. Moderate landings of pink salmon occurred over the first 15 days. Late in the run, there was a coordinated effort to take advantage of the large pink salmon surplus. On July 17, an Emergency Order was issued that extended the western subdistrict boundary to improve fish quality. Harvest volume significantly increased as fishermen arrived from another subdistrict. This intensive fishing effort lasted three days and ended when these fishermen moved on to the Golovin Bay Subdistrict.

Several periods were scheduled to target coho salmon, but weather conditions made fishing and tendering difficult to coordinate. Finally, on July 17, the subdistrict was opened to continuous fishing until July 31, yet no additional deliveries were made due to poor weather.

The 1998 Moses Point Subdistrict total commercial season harvest taken by 23 permits included 105 chinook, 1,462 coho, 145,669 pink, and 2,311 chum salmon (Table 6). The chinook salmon harvest was well below average. The coho salmon harvest was 56% below

the recent 5 year average. Even though the chum salmon harvest was 161% above the recent 5 year average, it still fell 17% below the recent 10 year average. Pink salmon harvests have been inconsistent in the Moses Point Subdistrict like the rest of Norton Sound, but the total harvest for the subdistrict in 1998 was the highest on record.

Norton Bay - Subdistrict 4. The Norton Bay Subdistrict typically has difficulty attracting a buyer due to its remoteness and its reputation for water-marked fish. Consequently, regulatory changes were implemented that moved the western boundary from Six Mile Point to Isaac's Point in 1995 and the eastern boundary out to Point Dexter in 1998 in an attempt to improve fish quality. Due to lack of timely salmon escapement information, the Norton Bay Subdistrict is typically managed similar to the Shaktoolik and Unalakleet Subdistricts because they reflect similar trends in salmon return strength and timing. In 1998, there was no interest in salmon until the late coho season. Several 24 hour fishing periods were scheduled beginning August 3 and on August 17, continuous fishing was opened until August 31. There was no reported commercial harvest in the Norton Bay Subdistrict during the coho salmon fishery due to weather and there was no harvest of other salmon species due to lack of interest. There has actually only been three seasons in the last ten years when salmon have been commercially harvested in the subdistrict.

Shaktoolik and Unalakleet - Subdistricts 5 and 6. Both the Shaktoolik and Unalakleet Subdistricts, which share a common boundary, consistently attract commercial markets due to larger volumes of fish and better transportation services. Management actions typically encompass both subdistricts because salmon tend to intermingle and the harvest in one subdistrict affects the movement of fish in the adjacent subdistrict. As stated earlier, the department's test net in the Unalakleet River and subsistence interviews at Unalakleet are used to set early fishing periods in both subdistricts. As the season progresses, the test net, commercial catch indices, the Shaktoolik River counting tower, and the North River counting tower operated in cooperation with Kawarak Corporation, are used to assess return strengths of each salmon species. Aerial surveys are frequently not obtained in either subdistrict due to poor survey conditions and are only useful for late season escapement assessment because of the long travel time between the fishery and the spawning grounds.

Commercial fishing is typically only allowed after chinook salmon have been observed entering the Unalakleet River in increasing numbers for a week's time to assure the harvest is directed on actively migrating stock and not on milling fish. In 1998, the first fishing periods for chinook salmon in both subdistricts opened on June 15 and again on June 18 for 24 hours each (Table 6 and 7). They were directed at chinook salmon using a minimum mesh size restriction of 7.5 inches. The chinook salmon harvest was near average for early periods, but escapement lagged; therefore, subsequent periods were canceled.

Both subdistricts reopened to chinook salmon fishing on June 25 for 24 hours. Assessment of the Unalakleet River run remained at desired levels; while the Shaktoolik River indicators did not improve. Consequently, the fishing time during that period was extended for the Unalakleet Subdistrict, but closed as planned in Shaktoolik. The Unalakleet Subdistrict fished one additional 48 hour period and one 24 hour period for chinook. There

were no additional periods for chinook at Shaktoolik due to the low escapements as indicated by the counting tower.

Both the Unalakleet and Shaktoolik Subdistricts opened on June 28 for a 12 hour pink salmon period that allowed only gillnets with mesh sizes 4" to 4 ½" to be used. This period was staggered between king openings to test the abundance of pink salmon and check the pink to chum salmon ratio. The economic viability of the pink salmon fishery depended on a large volume which meant that directed fishing would need to begin as soon as possible. However, there was only a small market for chum salmon. Consequently, it was very important that the incidental chum salmon harvest be minimized at a level that the market could absorb and not create a wastage problem.

A short "test" opening was allowed to assess chum/pink ratios. The results of the opening were favorable; therefore, both subdistricts were opened on June 29 to continuous pink salmon fishing through July 25. The justification for this liberal fishing time was the large surplus of pink salmon returning as anticipated. The incidental catch of other salmon species was small. A limited market existed for the low volumes of these species. This schedule also provided the fish buyer the flexibility needed to schedule tenders and processing operations to maximize efficiency. The buyer maintained radio contact with fishermen to set fishing periods.

Catches of pink salmon were significantly better nearer Shaktoolik than Unalakleet. The Unalakleet return was smaller than expected, but there were also chinook salmon fishing periods in the Unalakleet Subdistrict that overlapped pink salmon fishing which may have attracted some of the effort. During these periods, both chinook and pink salmon gear were allowed in combination, but not to exceed 100 fathoms in aggregate. Most fishermen appeared to comply and targeted chinook salmon when they had the choice. These combination periods occurred near the peak of the pink salmon return. Pink salmon fishing essentially ended in both subdistricts on July 19 because the fishery had reached the end of the run and buying efforts had shifted to the northern subdistricts which have a slightly later run timing.

Chum salmon returns to eastern Norton Sound have been well below average in recent years. On July 27, a single 24 hour fishing period was opened in both the Unalakleet and Shaktoolik Subdistricts to test the abundance of coho salmon in relation to chum salmon. Early results showed that the coho salmon were predominate over chum in the catch. Continued protection of chum salmon past this date would do little to improve escapement. Therefore, since the market would still accept incidental chum salmon, the period was extended and both subdistricts were placed on the standard fishing schedule of two 48 hour periods each week. The coho return to both subdistricts appeared below average. Weather conditions were extremely poor for fishing and escapement assessment; frequent rain caused high, turbid water conditions in rivers. The Unalakleet Subdistrict remained on the standard fishing schedule through the remainder of the season because effort was low and it was assumed coho salmon were escaping undetected up flooded rivers. The Shaktoolik

Subdistrict was opened to continuous fishing from August 17 through August 31 to provide fishing flexibility during the persistent inclement weather.

The 1998 commercial catches in the Shaktoolik Subdistrict included 910 chinook, 3,624 coho, 236,171 pink and 7,080 chum salmon harvested by 28 permits holders (Table 1 and 6). The chinook salmon harvest was 48% below the recent 5 year average and 42% below the recent 10 year average. The coho salmon harvest was 71% below the recent 5 year average and 66% below the recent 10 year average. There was a very limited chum salmon market with most fish being purchased as an incidental catch of the chinook, pink, and coho salmon directed fisheries in both subdistricts. The total chum salmon harvest in the Shaktoolik Subdistrict was 29% below the recent 5 year average and 59% below the recent 10 year average harvest. The pink salmon harvest was less than the last two even year returns, 1994 and 1996, but was 24% above the recent 5 year average and 147 % above the recent 10 year average.

The Unalakleet Subdistrict commercial catch harvested by 52 permit holders included 6,413 chinook, 7 sockeye, 24,534 coho, 99,412 pink, and 6,210 chum salmon (Table 1 and 7). The chinook salmon catch was 5% above the recent 5 year average and 25% above the recent 10 year average. The coho salmon harvest in the subdistrict was 41% below the recent 5 year average and 46% below the recent 10 year average. The total chum salmon was 65% below the recent 5 year average and 75% below the recent 10 year average. The pink salmon harvest at Unalakleet for 1998 was also less than the 1994 and 1996 totals. This years catch was 26% below the recent 5 year average and 41% above the recent 10 year average for pink salmon.

Escapement

Table 3 summarizes escapement assessments for the major index river systems of the Norton Sound and Port Clarence Districts. These descriptions are often qualitative assessments described relative to historical returns. Some of the chum salmon assessments are described relative to more formalized biological escapement goals (BEG's) for index areas. These BEG's are not historic averages in all cases, but reflect a specific desired level of escapement. BEG's are usually an index of return strength based on peak aerial surveys or counting tower passage estimates.

Department escapement projects in the Norton Sound District include counting towers on the Kwiniuk, Niukluk, and Shaktoolik Rivers, a test net operated on the Unalakleet River, and a weir on the Nome River. Both the Unalakleet test net and the Kwiniuk tower projects have been in operation for many years. They provide comparable and timely information that is used as a basis for inseason salmon management decisions. The Nome River weir first began as a counting tower project late in 1993 and was operational as a tower in 1994 and 1995 before switching to an operational weir in 1996. The Niukluk tower became functional in 1995. Both the Nome and Niukluk River projects have limited years of data that can be used when making comparisons, but have proven to be reliable and will become

more valuable the longer they operate. This was the third season the Shaktoolik tower was operated. Project modifications were made that provided better data early in the season, but the tower flooded out again in 1998 when the river overflowed its banks for the third year in a row.

Four additional counting tower projects were also operated in the management area this season. The Snake, Eldorado, Pilgrim, and North River projects were setup and operated by Kawarak Corporation. The projects ran as cooperative ventures with the Department of Fish and Game who supplied technical advice and purchased some equipment. The projects supplied important daily information to the Department that was very useful to management of the local salmon resource and will also become more important the longer they run.

Assessment conditions were fair to good for most of the district in 1998 for chinook, chum, and pink salmon, but poor to unacceptable for coho salmon throughout the district. As usual, the Nome Subdistrict streams received the most intensive assessment efforts because salmon stocks local to the Nome area are strictly regulated, easily accessed by road system, and are exposed to intensive subsistence and sport fishing pressure.

Chinook Salmon. The Unalakleet and Shaktoolik Subdistricts are the primary chinook salmon producers in Norton Sound. The Norton Bay, Moses Point and Golovin Bay Subdistricts have also experienced a gradual increasing trend of chinook salmon returns in recent years. Overall, the 1998 Norton Sound District chinook salmon return was about average. Eastern Norton Sound streams generally produce larger runs and therefore, support larger harvests. Some drainages had strong returns of chinook salmon compared to recent years while lower than average returns were observed in neighboring streams. For example, escapement to the Shaktoolik River was below average even though the Shaktoolik Subdistrict experienced one of it's most restricted commercial chinook salmon seasons. Conversely, its neighbor to the south, the Unalakleet Subdistrict, had an average commercial harvest with slightly above average escapements.

Chum Salmon. Chum salmon escapements were variable throughout the management area in 1998. Streams in the northwestern portion of the area which include the Pilgrim, Sinuk, and Nome area drainage's had below average or below goal chum salmon escapements. An exception was the Snake River, which doubled its aerial survey goal. This aerial survey observation was supported by a tower count that also nearly doubled the recent high count. Spawning escapement indices for the middle subdistricts, Golovin Bay, Moses Point, and Norton Bay were above average or above goal for chum salmon. Escapement indices for both of the southern subdistricts, Shaktoolik and Unalakleet were below escapement goals.

Coho Salmon. Coho salmon are found in nearly all of the chum salmon producing streams throughout Norton Sound with the primary commercial contributors being the Unalakleet and Shaktoolik Rivers. Because inclement weather is normally experienced in this area during August and September, escapement data for all subdistricts can be somewhat sketchy. Streams in the northern subdistricts of Norton Sound are typically surveyed and the Unalakleet River test net has the best data set to compare coho salmon escapement in

southern Norton Sound. The newer assessment projects are intended to monitor coho as well as chum salmon, but still lack the data base. Nearly all escapement monitoring projects had gaps in operations of varying degrees due to high water in 1998. Overall, coho salmon escapements were average in the Nome and Norton Bay Subdistricts and below average in the rest of the district.

Pink Salmon. During recent years, pink salmon returns to Norton Sound have followed an odd/even year cycle with the even year returns typically much larger in size than the odd years. The 1998 return was down slightly from the record levels of the recent two even year seasons 1994 and 1996, but was substantially above current odd year levels. The relative abundance of pink salmon returning was greater in the northern subdistricts than in the south.

Management Concerns

Chum salmon stocks have been depressed throughout Norton Sound over the past eight to ten years with escapements in the northern subdistricts continuing to be a major concern. Chum salmon escapement goals are generally being met, but the cost has been a drastic reduction in all forms of harvest in many instances. The Nome Subdistrict was closed again in 1998 during the entire chum salmon run to sport and commercial fishing. Subsistence fishery management actions included intense management on a stream-by-stream basis. Most streams in the Nome Subdistrict were closed to directed chum salmon subsistence fishing for the majority of the season. The Golovin Bay, Moses Point, and Norton Bay Subdistricts attained their escapement goals with minimal commercial harvests. Both the Shaktoolik and Unalakleet Subdistricts had chum salmon escapements below their goals with each having very small incidental commercial harvests. Both the Eldorado and Kwiniuk Rivers were removed from the "Rivers of Concern" because they attained their escapement goals in each of the last four years. However both streams continue to have depressed total returns which can support only small harvests. Even though escapement goals are generally being attained for most index streams in Norton Sound, chum salmon harvests will continue to be managed conservatively to assure future returns.

The renewed interest in Norton Sound pink salmon commercial fishing has proven feasible and manageable on strong year classes, but is questionable during weak return years. Management plans should be developed that set exploitation levels and escapement needs, gear and harvest requirements, and considers incidental weak stock impacts.

Salmon marketing conditions have become significant factors for consideration when scheduling fishing periods. Market conditions have caused more restrictive limitations than biological factors in recent years for many species. Fish buyers frequently notify the Department of Fish and Game that they can only handle a limited quantity with a high quality standard and at a specific rate to optimize their operations. The fishery manager must not only monitor the salmon returns and harvest rates, but also must coordinate

schedules with the salmon buyers to protect the limited markets available for Norton Sound salmon.

The Board of Fisheries is looking into formulating a management plan to deal with the subsistence salmon fishing issue in the Nome area. The problem is that the chronic shortage of salmon does not satisfy all subsistence users needs. At the 1998 March meeting in Nome, the Board directed Nome area residents to create a Subsistence Salmon Working Group, which would gather together, reach consensus on options for how to deal with the issue, and consider the possibility Tier-II management. These suggestions would be presented to the Board at a 1999 March meeting in Nome. It is the intention of the Board to put into regulation a management framework that it feels would adequately resolve the subsistence salmon requirements. The outcome is not clear, but it is possible management of the Nome area salmon fishery may change significantly.

1999 Norton Sound Salmon Outlook

Salmon forecasts and harvest projections for the 1999 commercial salmon season are based on qualitative assessments of brood year returns, subjective determinations of freshwater over-wintering and ocean survival, and projections of local market conditions. Salmon buyers will probably operate in only some of the Norton Sound subdistricts during 1999. The chinook return is expected to be average with a commercial harvest ranging from 6,000 to 8,000 fish. A pink salmon market in unlikely in 1999. The pink salmon escapements during recent odd years have declined somewhat from stronger escapements in 1991. The 1999 chum salmon return is expected to be below average, while the market for Norton Sound chum salmon will likely be minimal. The commercial harvest of chum salmon will be managed conservatively to provide a potential harvest between 20,000 and 40,000 fish. The 1995 coho salmon commercial harvest and escapements indicate that the 1999 coho return will be average and the commercial harvest is expected to range from 50,000 to 70,000 fish.

PORT CLARENCE DISTRICT

District Boundaries

The Port Clarence District encompasses all waters from Cape Douglas north to Cape Prince of Wales including the Salmon Lake and Pilgrim River drainage (Figure 2). Salmon, saffron cod, whitefish and herring are the major subsistence species; however, other fishery resources are also utilized.

Commercial Fishery

Commercial salmon fishing in this district has been prohibited since 1967. In 1966 a total of 1,216 salmon consisting of 93 sockeye, 131 pinks and 922 chums was taken commercially in the Grantley Harbor/Tuksuk Channel area. A few salmon are sold or bartered each year in Teller and Nome. Due to the relatively small runs in this area and the existence of an important subsistence fishery, commercial salmon fishing has not been reopened.

Subsistence Fishery

A traditional subsistence salmon fishery has probably occurred within this district for centuries; however, subsistence fishing has only been reported at Salmon Lake since the 1930's and monitored at the upper Pilgrim River since 1962. Data collected by Department personnel has indicated a majority of the fishermen of Brevig Mission fish the northern and northeastern sections of Port Clarence, while Teller fishermen utilize Grantley Harbor and Tuksuk Channel. Interviews with local residents have also indicated substantial fishing effort within the Agiapuk River. Village subsistence surveys had been conducted annually by the Division of Commercial Fisheries up until 1983 (Appendix Table B1). Subsistence Division conducted a partial survey of Brevig Mission in 1989. The department has conducted full-scale household surveys of both villages since 1994.

Salmon Lake and Pilgrim River stocks have been utilized by Nome residents in addition to those of Brevig Mission and Teller. The Alaska Board of Fisheries adopted a regulation in 1972 that closed Salmon Lake and tributaries to subsistence salmon fishing from July 15 through August 31 to conserve declining sockeye salmon stocks. Subsistence salmon fishing permits are required for the Pilgrim and Kuzitrin Rivers. Beginning in the 1991 season, an increase was observed in the number of subsistence permits issued to Nome residents intending to fish in the area. This was due in part to a strong sockeye salmon return. Another reason was the extensive subsistence fishing closures in the Nome area that made the Pilgrim River an alternative location to obtain their subsistence needs. In 1998, 12 households requested permits for this area (Table 2). Some subsistence salmon fishing by Nome residents in the Port Clarence District may not be documented by household surveys or permit data. Permits are required only on the Pilgrim River.

The 1998 estimated subsistence salmon harvest in Port Clarence District was 14,179 fish. This was about twice the 1997 harvest, and larger than the harvests in all but one year since 1994. Of the total harvest, 2.0 percent were chinook, 18.5 percent were chum salmon, 55.1 percent were pink, 12.0 percent were sockeye, and 12.4 percent were coho. A summary of the subsistence salmon harvest estimates by community is presented in Table 9.

The estimated mean harvest in the Port Clarence District was 90 salmon per household, which included 2 chinook, 17 chum, 50 pink, 11 sockeye, and 11 coho. Brevig Mission had a mean household harvest of 98 fish and Teller had a mean household harvest of 97 fish. Households with Pilgrim River permits harvested a mean of five fish per household.

In the Port Clarence District, 44 percent of households subsistence fished for salmon in 1998. About 15 percent helped other households process subsistence-caught fish. No subsistence caught salmon were reported to be used for dog food. Set gillnets were used by 72 percent of the households to harvest salmon, while rod and reel was used by about 41 percent, and seine nets used by 8 percent. Only two percent of the salmon harvest was caught with rod and reel. Approximately 53 percent of the fishing households responded that their chum fishing season was "poor" and 36 percent said "average". About 11 percent said the chum fishing season was "very good" (Georgette and Utermohle, 1998).

Escapement

Aerial surveys are not typically flown in this district, with the exception of Salmon Lake, due to the low priority assigned to areas which do not support commercial fisheries. Aerial surveys show an increasing trend of sockeye returns to Salmon Lake since 1986 (Appendix Table B2). The 1998 aerial survey count was 5,210 red salmon. Recent year counts are in the upper end of the range and reflect an increasing population of red salmon.

KOTZEBUE SOUND DISTRICT

History

The Kotzebue Sound District supports the northernmost commercial salmon fishery in Alaska (Figure 3). The Kotzebue District is divided into three subdistricts. Subdistrict 1 has six statistical areas where the commercial salmon fishing occurs (Figure 4).

The recent commercial fishery opened under state management in 1962. Salmon harvests consist primarily of chum salmon although limited amounts of Dolly Varden and a few chinook salmon are harvested as well. There are 215 commercial permit holders, of which an average of 124 were active over the ten year period 1988 to 1997. Eighty-seven percent of the permitees are residents of the district and 99 percent are residents of the state.

The earliest documented sales of salmon in the Kotzebue District were in 1909 when Lockhart's store purchased 21,906 pounds of salmon from local Native Alaskans and resold it at $0.05/lb. Of that, 21,366 pounds were sold to gold miners on the Kobuk River drainage and 540 pounds were sold to a company in Seattle. A commercial fishery occurred from 1914 to 1918. Salmon were canned and the bulk of the harvest was thought to have been sold to miners working in the upper Kobuk River drainage. The next organized commercial fishery began under state management in 1962 and continues to the present. The current fishery became fully developed in the mid-1970s. The fishery displayed a gradually declining pattern of overall run strength with four year cycles of stronger returns followed by weaker returns. In 1987, the fisheries managers began a rebuilding program with an emphasis on attaining escapement goals. Prior to 1987, harvest had been proportional to total return. During the last few years, poor market conditions have caused harvests to fall short of their potential and consequently escapements have been very strong.

In 1981, a chum salmon hatchery was established at Sikasuilaq Springs, a tributary of the Noatak River. The hatchery was closed in 1995 due to lack of funding support. At peak production, the hatchery incubated 11,100,000 eggs in 1992. An estimated peak production adult hatchery return of 90,000 chum salmon occurred in 1997. The estimated contribution to the commercial fishery was approximately 50%.

General Information

Each commercial fisherman is limited to 150 fathoms of gear. These gillnets are generally operated as a single unit of gear, although the nets are occasionally broken down to single 50 fathom shackles. Most gillnets are made of 5-7/8 inch stretched measure multifillament web. Fishermen generally operate with one end on or near shore and with

other salmon species, which are present in only small numbers in the district. The 1998 subsistence salmon harvest was the lowest of the past five years. Wet weather and high water during the fishing season contributed to the reduced harvest.

The estimated mean salmon harvest was about 41 salmon per household. This included 38 chum, 2 pink, and less than 1 each of chinook, sockeye, and coho. Shungnak had the highest mean household harvest of 84 salmon. Noorvik had a mean household harvest of 97 salmon, Noatak 27 salmon, Kotzebue 35 salmon, Ambler 30 salmon, Kiana 34 salmon, and Kobuk 41 salmon.

In the Kotzebue District, 48 percent of households subsistence fished for salmon in 1998 and about 7 percent assisted other households in processing subsistence-caught salmon. About 14 percent of the subsistence harvest was used for dog food (excluding Kotzebue). Set gillnets were used by 66 percent of households for harvesting salmon, while 34 percent of households used rod and reel, 13 percent used seine and less than one percent used drift net. Only about 3 percent of the salmon catch was caught by rod and reel.

In the Kotzebue District, 48 percent of the fishing households responded that their chum salmon fishing season was "poor," 31 percent said "average," and 21 percent said "very good" (Georgette and Utermohle, 1998).

Escapement

A test fish project located just downstream from the Village of Kiana monitored escapement into the Kobuk River. The test fish index of 538 was the second lowest in the six years the project has been in operation (Table 14). When interpolations for missing data are added this is graphically presented in Figure 8. The index in the lowest year, 1993, was 494. Aerial surveys indicated that escapement was adequate in 1993. Due to lack of staffing no escapement monitoring was conducted on the Noatak River in 1998.

All time record rainfall and flooding prevented all but two aerial surveys. Both were conducted on September 10 well after peak spawning. The areas covered were the Eli and Kelly Rivers in the Noatak drainage and the Kobuk River upstream of Kobuk Village. Conditions during both surveys were poor due to turbidity and poor visibility. Carcasses had been washed away. A rough estimate of two-thirds of the desired escapement was observed during these surveys. A ground count conducted at Selby Slough on September 12 noted 736 chum salmon in an area with an aerial estimate of 600 (Appendix Table C8).

1999 Outlook

The outlook for the 1999 season is based on the returning age classes of the 1998 season. During the 1999 season, the four-year component of the return is expected to be above average, while the five and six-year-old components are expected to be well below average. The three-year-old component is generally small, and it is likely to be near average. The commercial harvest is expected to be well below average and to fall within the range of 150,000 to 250,000 chum salmon, if market conditions can accept that level of harvest.

Section 2: PACIFIC HERRING

(Includes Norton Sound and
Port Clarence/Kotzebue Districts)

SECTION 2 - PACIFIC HERRING

INTRODUCTION

Boundaries

The Norton Sound District consists of all waters of Alaska between the latitude of the western most tip of Cape Douglas and the latitude of Canal Point Light (Figures 9). The Port Clarence District consists of all waters of Alaska between the latitude of Cape Douglas and the latitude of Cape Prince of Wales. The Kotzebue Sound District consists of all waters of Alaska between the latitude of Cape Prince of Wales and the latitude of Point Hope (Figure 10).

Spawning Areas and Timing

The arrival of Pacific herring on the spawning grounds is greatly influenced by climate and oceanic conditions, particularly the extent and distribution of the Bering Sea ice pack. Most herring spawning populations appear near the eastern Bering Sea coast immediately after ice breakup between mid-May and mid-June. Spawning progresses in a northerly direction and may continue into July or August along portions of the Seward Peninsula or within the Chukchi Sea.

The primary spawning areas within Norton Sound have been from Stuart Island to Tolstoi Point. When sea ice has remained in this area into June, spawning has been more extensive along Cape Denbigh and several locations along the northern shore of Norton Sound between Bald Head and Bluff. More northerly spawning areas have been more difficult to identify due to small herring stock sizes and limited investigations. Likely spawning areas include Imuruk Basin, Shishmaref Inlet, Deering-Kiwalik coast, and Hotham Inlet.

NORTON SOUND DISTRICT

Fishing History

Pacific herring *(Clupea harengus pallasi)* have been utilized for subsistence purposes by coastal residents prior to the mid-1800's when their use was first documented by early explorers. The earliest American commercial effort on Bering Sea herring apparently took place in the early part of this century at Golovin Bay in Norton Sound (Appendix Table D1).

Food Herring

Early records indicate that about 3,200 short tons of "fall herring" were processed in Norton Sound from 1916 to 1941 (Appendix Table D1). This fishery was dependent on salt curing and declined because of poor marketing conditions arising from foreign competition. The Japanese began gillnetting in Norton Sound during 1968 with three vessels. Effort was concentrated about 12 miles offshore between St. Michael and Golovin. Approximately 40 Japanese vessels reported harvesting a record 1,400 short tons (st) of herring during 1969 (Appendix Table D2). An average annual harvest of approximately 440 st was reported in Norton Sound by the Japanese during 1968-1974. The Japanese gillnet fishery was prohibited in 1977.

Sac Roe

Domestic commercial effort resumed in Norton Sound in 1964 near Unalakleet and continued on a sporadic basis until 1979. Between 1964 and 1978 the fishery averaged about 14 short tons of herring annually and targeted on "spring herring" for sac roe extraction (Appendix Table D1). In 1979, a domestic herring fishery for sac roe began on a larger scale in Norton Sound when approximately 1,292 short tons (st) of herring were taken by 63 fishermen (13 purse seiners, 50 gillnetters). Purse seiners took 70% of the total catch.

After the 1979 season, the Alaska Board of Fisheries adopted a public proposal which made gillnets and beach seines the only legal commercial herring fishing gear within Norton Sound. A purse seine fishery could only be opened if the gillnet fleet could not take the allowable harvest. This regulation was an attempt to encourage involvement of local fishermen in this developing fishery. During the 1980 season, 294 gillnet fishermen harvested 2,452 short tons of herring (Appendix Table D3). Because gillnet fishermen demonstrated that they were capable of taking the available harvest, a regulation was passed in 1981 which prohibited any purse seine gear within Norton Sound.

Prior to the 1984 season, the harvest by beach seine fishermen was negligible. During 1984, ten beach seine fishermen harvested 327 st. During their 1984 fall meeting, the Board of Fisheries set a beach seine gear limit of 100 fathoms and limited the harvest to "not exceed 10 percent of the total herring sac roe harvest projection as published by the department." During the fall 1987 Board of Fisheries meetings, beach seine gear was further restricted to a limit of 75 fathoms. Beach seine harvests since 1985 have averaged 6.3% of the total reported harvest.

As with any developing fishery, fishing effort increased with each successive season. In 1984 Norton Sound became a Super-Exclusive Use herring fishing district in order to slow growth and bolster local involvement, but with only limited success. The 1987 season had the highest level of fishing effort on record with a total of 564 fishermen making at least one delivery, where 559 gillnet and 22 beach seine permits recorded landings. This was more

than twice the average effort from 1980 through 1986. Local Norton Sound area residents accounted for only 36% of the effort and 29% of the total harvest.

A public proposal to the fall 1987 Board of Fish was adopted that changed the Norton Sound Herring Fishing District to Limited Entry status. Beginning with the 1988 season, a moratorium was placed on Norton Sound where no new entrants were allowed into the fishery. The Limited Entry Commission is reviewing and awarding limited entry permits to fishermen based on fishing history and will eventually reduce the total number to 301 gillnet and 4 beach seine permits as directed by the Board of Fish. Currently, most fishermen have already received limited entry permits and others are still fishing with interim-use permits while their eligibility is being evaluated on a case-by-case basis.

Commercial harvests from 1981-1984 averaged 4,137 st, and ranged from a low of 3,662 st in 1984 to 4,582 st in 1983 (Appendix Table D3). From 1985-1988, commercial herring harvests averaged 4,374 st, ranging from a low of 3,548 st in 1985 to a high of 5,194 st in 1986. And most recently, from 1989-1991, harvests have averaged 5,596 st, ranging from 4,743 st in 1989 to 6,373 st in 1990. Stock status, product value and climatic factors influence level of commercial harvest.

Spawn on Kelp

A small-scale spawn-on-kelp *(Fucus)* fishery existed in Norton Sound from 1977 to 1984. Harvests during the 1977-1984 period ranged from less than one ton (1977) to approximately 46 st (1981). In addition, during the 1984 season, one ton of macrocystus kelp was imported into Norton Sound resulting in a harvest of approximately 3 st of product. In response to a public proposal, a Board of Fisheries action prior to the 1985 season resulted in the closure of all spawn-on-kelp fisheries in Norton Sound.

The 1998 herring market was known to be poor before the southernmost fisheries opened. The Alaska Board of Fisheries approved an experimental herring spawn on *Macrocystis* kelp fishery to operate in Norton Sound during the 1998 season. The Commissioner approved emergency regulations to allow a hering spawn wild *Fucus* kelp fishery shortly before the normal start of the sac roe fishery. The intent of these decisions was to allow as much opportunity as possible to sac roe permit holders, since there would be an opportunity for only a small minority to participate in the sac roe fishery.

Management Strategies

The overall statewide management strategy is to annually harvest 0-20% of the herring biomass. The upper end of the exploitation range is applied to stocks in good condition. The lower end of the exploitation range is applied to stocks that are exhibiting a trend of decreasing abundance and poor recruitment. If a minimum threshold level is not achieved, 7,000st for Norton Sound, no commercial fishery will be allowed.

Typically herring are long lived fish and will usually remain harvestable for at least 5 years after recruiting into the fishery. Harvesting only a percentage of the biomass ensures that some fish will be held over for following years. This type of strategy helps mitigate population fluctuations caused by successive years of poor recruitment, a common occurrence in marine spawning fish. Prior to 1983, harvests in Norton Sound were regulated on a subdistrict basis so harvests would be dispersed over the entire fishing grounds. This was to prevent harvest efforts from concentrating in one area on what was then thought to be a distinct stock of fish.

Since methods to reliably forecast herring returns are still being developed and estimates of recruitment are not available, in-season assessments of biomass supersede the projected biomass for management of the Norton Sound herring fishery. The herring biomass is managed for a 20% exploitation rate at biomass levels twice the closure threshold or greater. Reduced harvest rates have been discussed as the biomass level approaches the threshold but the situation has never arisen. If the run does not materialize as projected, the harvest exploitation rate may be reduced to a lower level.

Generally, fisheries management staff have tried to set fisheries openings to allow gillnetters to fish the flood tide as it crests. The belief that the ripe females approach the beach at that time to spawn figures heavily in this strategy. The Norton Sound fishery covers a large area with varying tides. Because the large gillnet fleet can't "fit" into individual subdistricts, opening at the optimal time throughout the district is not always possible. The fishing fleet must be flexible to maximize catches.

The magnitude of beach seine openings is dependent on herring abundance near the beach and favorable weather conditions for spotters and fishing. Beach seiners prefer to work flood tides similar to those gillnetters favor, however, fisheries managers frequently provide less optimal fishing times. The beach seiners have shown the ability to harvest their allotment of 10% of the preseason harvest goal in a single three hour opening under ideal conditions. By the nature of the gear, beach seiners have the potential to wrap up large numbers of fish that could potentially exceed their allocation. Therefore, the management staff have often chosen to reduce the beach seine efficiency by allowing a gillnet opening to occur before the beach seine opening in order to break up school size and reduce the likelihood of excessive harvests. Occasionally, the beach seine fleet has been used to test the roe quality of herring newly arrived in nearshore waters prior to a gillnet opening where the potential for waste would have been great had the entire gillnet fleet fished on poor quality herring.

1998 SEASON SUMMARY

The 1998 herring market was known to be poor before the southernmost fisheries opened. A group of local herring fishermen approached the Board of Fisheries about *Macrocystis* spawn on kelp fishery. Their intent was to diversify opportunity to harvest and market

herring. The board allowed a test fishery with harvest limits of 2000 blades per permittee and fishery cap of 75,000 blades. As the season approached it became apparent the Norton Sound sac roe fishery would be greatly diminished due to a poor market. It was decided to allow spawn on kelp harvests over most of the district. Wild kelp harvests were approved by emergency regulation shortly before the normal sac roe fishery dates. The intent of these decisions was to allow as much opportunity as possible to sac roe permit holders, since there would be an opportunity for only a small minority to participate in the sac roe fishery. Only 35 sac roe permit holders participated in the sac roe and bait fisheries. Roughly 320 permits are on record for this fishery.

FISHERY SUMMARY

Spawn on Kelp

Permit holders wishing to participate in the Macrocystis spawn on kelp fishery were required to register with the Nome Fish and Game office by April 16. This date was chosen to provide a decision point which would still allow adequate time to gear-up for the fishery which was anticipated to begin as early as May 18. Twenty-two permit holders registered. Eleven of which deployed their kelp in Subdistrict 5 and eleven of which expressed their intent to deploy in Subdistricts 1 and 2. Seven permitees reported harvests from Subdistrict 1. In addition to the Macrocystis harvest, three individuals reported harvests of wild kelp (Table 19).

The Board of Fisheries purposely chose to leave the gear specifications fairly broad to allow participants to experiment and test a full range of ideas on how best to deploy kelp to facilitate the accumulation of herring spawn. The deployment methods fell into two general categories: floating frames and long lines. Frames were constructed of wood and insulated water pipe. The kelp was suspended from parallel lines strung across the frame. The frame deployment technique appeared to be the most successful method of kelp deployment. There were several variations of the longline method ranging from rope cork lines, fire hose or rigid pipe on the surface with secondary lines running to the bottom or back to the floating line. In most cases the long line method resulted in a linear deployment of kelp. The most successful longline arrangement the staff observed was a spiral arrangement that resulted in a clumped deployment of kelp, similar to the frame deployment. Participants in this fishery reported poor success with kelp deployed closer than 18 inches to the surface or with kelp that dragged the bottom. It was important to be in close proximity to wild plants with an on-going spawn to initiate spawn on the imported kelp.

Logistic problems encountered in the fishery included: poor timing on the arrival of the kelp, both early and late, inadequate shelter after deployment, damage to stored kelp by ice movement and storms, and the inability to follow the spawning migration. The kelp arrived in good condition, but the loads differed as to blade size and quality. Different contractors picked the loads. The air transport was operating at the edge of their range and one of the planes crashed on their return trip. The plane was rumored to have run out

of fuel. The kelp arrived at Elim on May 24. During the next several days the ice in Norton Bay broke-up and moved past Elim. Some kelp was stored on shore with frequent saltwater baths and the remainder was kept in sunken net bags a few hundred yards offshore. The sunken bags were caught and drug three days later during a heavy ice movement. Kelp stored in the holds of the boats for approximately one week had significant losses despite the efforts to circulate water over the vegetation. Kelp suspended from frames kept viable for about 10 days. The life of the kelp there was limited by grazing sea life such as sea urchins and snails.

The final sales of the spawn on kelp have not been completed. No value figures are available at this time.

Sac Roe

The 1998 Norton Sound herring fishery opened by emergency order on May 22. Because of the depressed market, the season was opened and left open to be managed by the two buyers participating in the fishery. One company ceased operations on June 4 and the other on June 9. Because of the poor market the educational permit was unable to sell their catch and chose to distribute a small harvest to subsistence users in Unalakleet.

The total harvest based on fish ticket data was 2,623.6 short tons (st) of herring (Table 18). The tonnage in the 1998 reports is wet weight. One company chose to report in dry weights, which resulted in a 10 percent reduction in weight. Staff converted the reported harvest to wet weights, which have been the standard reported weight in recent years

There were 35 sac roe fishermen who made at least one delivery during the season. Of those gill-netters 18 were Norton Sound residents, 6 from the lower Yukon, 6 other Alaskan residents, and 5 from outside the state.

During the 1998 season, all sac roe fishermen used gill nets, landing a total of 2,623.6 st. The average sac roe recovery for gill net caught herring was 9.2 (Table 18). An effort was made to separate the spawn on kelp fishery from the gill net fleet to prevent gear conflicts and to enable the Department to better monitor the both fisheries.

There were 2 companies present on the grounds during the season to purchase herring. These 2 companies registered 2 processors and 6 tenders.

Based on final operations reports, it appears the average price advanced for a short ton of 10% roe herring was approximately $71.57. None of the harvest was purchased as bait. The total value of the herring harvest to the fishermen was approximately $203,470.

Bait

A permit holder from Nome requested that a bait fishery be allowed after the sac roe fishery finished. Approximately 8.3 st of herring have been landed as bait. The majority of the bait

was harvested by a single permitee for use in the local halibut and crab fisheries, but a small amount was harvested by crab permitees for their own use. Approximately 16,550 pounds of bait were sold at $0.93 per pound. The value of the harvest is approximately $15,435.

Fishery Management/Emergency Orders

When it became apparent there would be only two sac roe buyers this season, those buyers requested they be given more freedom to direct the fishery. There was little concern for over harvest given the large preseason harvest projection. The precedent had been set in several salmon fisheries in the region where stock size exceeded market demand to allow very broad fishing schedules at the discretion of the buyer. As soon as marketable roe quality was observed the fishery was opened until further notice.

The first confirmed sighting of herring was made on a May 19 aerial survey. Biomass built gradually. Roe maturity tested well on the first samples and improved over the next three days. Spawn was first observed on May 19. By May 21, spawn was beginning to accumulate on Fucus in Subdistrict 1. The gillnet fishery opening was announced on May 22. Only Subdistrict 5 was closed to sac roe fishing in keeping with the Management plans published prior to the season. The *Macrocystis* management plan was in effect prior to the season. The portion of Subdistrict 1 west of Five Mile Point was closed to spawn on kelp harvest to minimize gear conflicts. The imported kelp was deployed as it arrived beginning May 22. Two wild kelp openings were allowed on May 29 and June 1 for 10 and 7 hours each.

The peak aerial survey count was made on June 8 when the all time record biomass observation of 49,464 st. was estimated (Table 16). This does not include the harvest taken to that date. The biomass declined rapidly after that date.

Catch Reporting and Enforcement

Buyers registered for the 1998 season were required to report herring purchases daily (8:30 a.m.) and three hours following the closure of each period. Daily reports were required to be called in to the Unalakleet office. In general, compliance with requested catch reports was very good. The VHF radio turned out to be the communication equipment of choice due to the range of the SSB radio equipment. Communications with the field camps was accomplished with marine VHF, SSB or by aircraft radio from the aerial survey plane.

Protection efforts in Norton Sound consisted of 3 single engine aircraft (two super cubs on wheels and one Cessna 185), The PV Wolstad and 2 small boats. Personnel consisted of 7 permanent, full-time Fish and Wildlife Protection officers, 2 seasonal assistants and a US Fish and Wildlife agent. No citations were issued. Fish and Wildlife Protection officers patrolled the grounds early in the fishery.

Abundance and Research

Two Department field crews were operational during the 1998 season. One crew operated from Cape Denbigh and the second crew operated from Klikitarik. The test fish crew's presence and sampling efforts on the herring grounds are critical to the proper management of the fishery and biological documentation of the stocks.

Unalakleet field office personnel during the season consisted of the area management biologist, the Norton Sound and Kotzebue assistant area management biologists, the catch monitor, and one biometrician from the Anchorage Regional office. Norton Sound Economic Development Corporation supplied two fishery interns to assist ADF&G in test fishing and sampling during the herring fishery.

Test fish crews sampled 2,756 herring caught with variable-mesh gillnets from May 18 through June 9 for biological data. Age 10 herring dominated the return in both biomass (40.3%) and in numbers of fish (33.4 %). The biomass consisted of 63.0% age 9 and older herring. Recruit herring, represented 24.9% of the return in numbers of fish (DuBois and Hamner, 1998).

A total of 1,143 herring were sampled from the commercial harvest. Age 10 herring dominated the harvest comprising 40.3% of the catch by weight. Age 9 and older herring represented 63.0% of the catch. Recruit herring comprised less than 1% of the harvest (DuBois and Hamner, 1998).

Biomass Determination

A complete listing of the aerial surveys flown in Norton Sound this season is found in Table 16. Historically, the season biomass has been the peak aerial survey combined with the harvest as of the day the peak aerial survey was flown. This is essentially what was done in 1998. The peak aerial surveys of Subdistricts 1 through 7 were flown June 8.

1999 Outlook

The biomass projected to return to Norton Sound in 1999 is 41,169 tons. A 20% exploitation rate would result in a harvest of 8,234 tons. Ages 6 and 11 are expected to comprise over one-half the returning biomass (19.1%, and 35.5%, respectively). Age 9 and older herring are expected to contribute almost two-thirds of the return (DuBois and Hamner, 1998). Inseason assessment of herring biomass will supersede projected biomass for management of the Norton Sound herring fishery, except where weather prevents obtaining and inseason estimate. The beach seine harvest is, by regulation, 10% of the projected harvest, or 824 tons.

PORT CLARENCE / KOTZEBUE DISTRICTS

Introduction

The regulation book states that in the Port Clarence and Kotzebue Districts, herring may be taken from April 15 through November 15, except that herring may not be taken during the open commercial salmon fishing season. However, prior to the 1987 season, no spring sac roe commercial fisheries had ever occurred within these districts. Interest in exploring these stocks has been expressed in recent years by industry personnel operating in the Norton Sound District. However, no large scale effort to develop the fishery has occurred due to the late ice breakup and fishery timing in the Port Clarence and Kotzebue Districts.

The Port Clarence and Kotzebue commercial herring fisheries have been in regulation since 1982. The 1983 and 1984 regulation books set a guideline harvest of 150 mt (165 st) for each district. Since the guideline harvest has never been changed or repealed by the Board of Fisheries, it is assumed 165 st guideline harvest is still in effect. Presently purse seines, beach seines, and gillnets are legal commercial gear within these districts. Spawn on kelp fisheries are also allowed in regulation. Recent attempts at open pound Macrocysitis harvest in 1991 and 1992 were unsuccessful.

Local fishermen from Teller, Shishmaref, and Kotzebue have also expressed increasing interest in exploiting these stocks. While small harvests of herring for food/bait have occurred during the fall, the fisheries in these districts have been limited by lack of markets. Local fishermen and fishery operators in Kotzebue, Brevig Mission and Nome have also expressed interest in developing a spawn-on-kelp fishery within these districts.

Resource Investigations

Resource investigations of Port Clarence and Kotzebue Sound area herring stocks were conducted by ADF&G from March 1976-September 1978 (Barton 1978). These studies indicated that herring populations from Golovin Bay (Norton Sound) northward differed significantly in size and behavioral characteristics from herring populations occurring in the southern Bering Sea. Differences between populations were summarized as follows (Barton, 1978).

Seward Peninsula Populations	Southern Norton Sound to Southern Bering Sea Pelagic Populations
Smaller herring at age with lower vertebral counts.	Larger herring with probable higher vertebral counts.
Lower abundance.	Higher abundance.
Subtidal spawning (3m) in shallow bays, inlets and lagoons.	Intertidal and shallow subtidal spawning along exposed rocky headlands.
Zosteria sp. primary spawning substrate.	*Fucus* sp. primary spawning substrate.
More euryhaline.	Less euryhaline.
Overwinter in shallow bays; water is warmed by river discharge under ice cover.	Overwinter in deep ocean layers near the Pribilof Islands.
Fall (non-spawning) runs documented.	No fall runs documented.
Larval development in brackish water.	Larval development probable in more saline water.

Data collected from herring populations along the Seward Peninsula strongly indicated that a separate stock of herring occurs in the Port Clarence and Kotzebue Sound areas. This does not preclude the possibility of the occurrence of more southern stocks from utilizing this region, i.e, stocks which winter near the Pribilof Islands and migrate to the western Alaska coast to spawn. It is unlikely however, that herring stocks along the western Seward Peninsula migrate to the central Bering Sea for wintering, but rather remain in coastal lagoons, bays or inlets which are warmed by river discharge under the ice (Barton 1978). This may be a major factor in explaining size differences, i.e., environmental conditions. Water temperatures and feeding conditions in deep ocean waters are probably more favorable for growth than those in herring winter habitats along the Seward Peninsula, which apparently have become adapted to Arctic conditions (Barton 1978).

Aerial surveys are very difficult in the Port Clarence District due to organic coloring of the waters of Imuruk Basin, Tuksuk Channel, Grantley Harbor and to a lessor extent, Port Clarence. Aerial surveys were impractical in Imuruk Basin and Tuksuk Channel. Additionally, the presence of other species of fish caught in test commercial gear sets

indicate the need for verifying any biomass sighted. A further complicating factor within Port Clarence is the spring ice conditions. The Port is a very sheltered body of water which becomes stained to a high degree over the winter and takes some time to clear once the ice melts. Typically, the outside waters are significantly warmer than the inside waters which are covered by ice longer thereby slowing solar gain and water mixing. Soon after the ice begins to shift the herring move into the warm shallow lagoons to spawn. The herring are invisible to aerial observation once they enter the stained water. The best aerial survey conditions exist just outside the entrance to the Port, where the herring mass just prior to the ice moving. One or two surveys have been flown each of the past several years, but virtually no herring have been observed because the narrow window of time for seeing the fish has been missed.

Spring/Fall Food/Bait Fishery

Although a fall fishery has probably existed for subsistence use within these areas for many years, a commercial venture has only been attempted recently. The primary use of those fish are for crab bait and dog food. The fishery typically occurs during September and the ice free portion of October. A fish buyer located at Nome in 1994 and 1995 who provided a ready crab bait market and transportation for the fish had facilitated the harvest. A small bait fishery with a harvest less than 10 tons occurs in most years. However, no bait fishery occurred in 1997 and 1998 (Table 20).

Sac Roe Fishery

The Port Clarence fishermen have been unable to attract a sac roe buyer for their relatively late fishery. During 1991 and 1992, one individual imported macrocystus kelp and attempted an open pound. No herring spawned on the imported kelp, although ripe herring were found in close proximity and very light spawn was found on blades of *Zosteria sp.* nearby.

SECTION 3: KING CRAB
(Includes Norton Sound,
Port Clarence and Kotzebue Districts)

SECTION 3 - KING CRAB

INTRODUCTION

Norton Sound

The Norton Sound Section of the Northern Bering Sea District consists of all waters in statistical area Q that are north of the latitude of Cape Romanzof, east of 168 west longitude, and south of the latitude of Cape Prince of Wales (Figures 14 and 15). A large vessel summer commercial red king crab *(Paralithodes camtschatica)* fishery has existed in the Norton Sound Section from 1977 through 1992 (Appendix Table E3). No summer commercial fishery occurred in 1991 due to a lack of staff necessary to manage the fishery. The budget had been cut the previous winter. In 1992, the large vessel summer commercial fishery resumed. Regulation changes adopted during the March 1993 Board of Fisheries meeting changed the character of the fishing fleet to that of a small boat fleet. A superexclusive designation went into effect for the Norton Sound commercial crab fishery June 27, 1994. A vessel registered for the Norton Sound crab fishery may not be used to take king crab in any other registration area during that registration year. Federal regulators established a vessel moratorium in 1997 that restricted new entrants in to the fishery to only those vessels 32 inches or less.

The National Marine Fisheries Service conducted their most recent trawl survey to examine the abundance of Norton Sound red king crab in late August 1991 (Appendix Table E5). The results of that survey as compared to the 6 previous trawl surveys show a gradual trend of increasing abundance since 1982. The 1991 survey found 3.5 million pounds of legal king crab in the commercial fishing district. NMFS has not made a survey of Norton Sound since 1991. The quota for the Norton Sound Section for the 1996 season had been set at 340,000 pounds, to approximate an exploitation rate of 10%.

The Alaska Department of Fish and Game conducted a trawl survey to examine the abundance of Norton Sound red king crab from August 7 through August 18, 1996 (Appendix Table E5). A population estimate was generated which indicated the legal biomass had declined to 40 percent of the biomass estimated in 1991. The results from the 1996 trawl survey prompted the fishery managers to reduce the harvest rate in the 1997 and 1998 commercial fishery to five percent of the legal biomass and set the guideline harvest at 80,000 pounds. This is a significant reduction from the previous exploitation rate and guideline harvest. The Alaska Department of Fish and Game plans to conduct a trawl survey in August of 1999.

St. Lawrence Island

The St. Lawrence Island Section lies immediately west and north of the Norton Sound Section. Because the Bering Sea crab fleet bases in Dutch Harbor, the St. Lawrence Island Section has been managed by ADF&G's Westward Region's Dutch Harbor office. Until recently, the Dutch Harbor fishing fleet has been the primary commercial group interested in that area. The only reported commercial catches to date in the St. Lawrence Island Section were made in 1983 when 52,557 pounds of blue king crab were delivered from 13 landings, in 1989, when 3,603 pounds of red king crab and 984 pounds of blue king crab were delivered from 8 landings, in 1992 when 53 pounds of blue crab were landed and in 1995 when 7,913 pounds were delivered from three landings.

In 1983, the commercial crab fleet concentrated near the southeast shore of St. Lawrence Island. The following year a regulation proposal to close the waters within 10 miles of all inhabited islands within the section was adopted in an attempt to protect stocks targeted by local fishermen and reduce impacts on subsistence marine mammal harvests during the winter. During the 1989 season, three fishing vessels prospecting in that section found relatively few blue king crab near rocks and shoals still open to commercial fishing, but red king crab were discovered in low densities near Kivalina, the northern boundary of the section. The villagers of Little Diomede Island have also traded and sold winter caught blue king crab with residents of Nome and other villages for years. The Department has not been able to obtain an accurate estimate of the magnitude of this trade. The remoteness of this village is also a factor contributing to the lack of catch records. Current regulation allows the commercial harvest and sale of king crab near shore during the winter. The Board provided the same provisions in the regulation as are in effect for Norton Sound to allow a commercial winter fishery. However, local residents of St. Lawrence Island have decided not to export any of their winter catch for commercial sale.

1998 COMMERCIAL FISHERY

Norton Sound Summer Commercial Fishery

The 1998 summer commercial red king crab fishery opened at 12 noon, July 1 in the Norton Sound Section. The first fishers registered July 7, and the first delivery was not made until July 16. The fishery was closed by regulation at 12 noon, September 3. A total of 11 fishing vessels and 13 fishers were registered for the summer commercial crab season. Ten fishers were registered as catcher/sellers. No large vessels participated in the 1998 summer season. No floating crab processors or catcher/processors operated in Norton Sound during the 1998 summer fishery, therefore no independent observers were placed on board commercial vessels. There was one company set up to purchase and process crab in Nome. A group of fishers acted as catcher/sellers and coordinated flying live crab to a buyer in Anchorage.

Included in the total harvest data were fourteen landings made by 8 fishermen registered as catcher sellers. The Lower Yukon crab fleet lost their live crab market in Anchorage on the day they pulled their pots for the final time. Fishers tried to sell most of their crab locally and also gave away crab to organizations in Nome. They brought approximately 600 crab back out to sea in an attempt to release them. These crab have been included in the total pounds of deadloss because it is unknown if they survived.

One ADF&G fishery biologist was stationed in Nome to monitor the fishery and sample legal crab delivered to buyers in Nome. This was the only person dedicated to collecting essential biological and management data, which is necessary in determining the magnitude and location of the commercial harvest and tracking the status of the stock. The observer also provides a means to enforce size and sex restriction regulations that protect the resource.

Public concern for declining nearshore catches and the apparent shift in crab distribution caused managers to announce their intent not to relax the nearshore closure line as their practice had been in recent years. As a result of crab distribution and the proximity to the closure line, most vessels traveled to the entrance of Golovin Bay to fish, but only one vessel chose to operate from the port of Golovin. No samples were collected from that vessel.

Catch reporting logs were kept by buyers and by skippers of catcher vessels for each statistical area fished. Buyers verbal reports were relayed daily by 9:00 a.m. to the ADF&G office in Nome. Fish tickets were due in to the ADF&G office on Friday of each week throughout the duration of the fishery. Vessel reports from fishermen and Catcher/Seller fish tickets were required every Monday for the duration of the fishery. Compliance with reporting requirements was good. Catch statistics can be found in Table 22.

Of the eight vessels which made deliveries in the 1998 season two registered from Norton Sound, five from the Yukon Delta and one was Alaskan but from outside the section. Norton Sound fishers caught one percent of the total harvest, Yukon Delta fishers caught 90% of the harvest and the remaining nine percent was harvested by other Alaskan residents.

Board of Fisheries regulations specific to Norton Sound Section are:

1) 5AAC 34.915, which directs the Department to manage the Norton Sound summer king crab fishery for a harvest of one half the exploitation rate determined under 5AAC 34.080.

2) 5AAC 34.935, which established a closed area with a defined boundary approximating 15 miles from the beach in the Norton Sound section, to protect a long established winter subsistence fishery.

3) 5AAC 34.925 (i) and (j), requiring pot tags and limiting vessels of 125 feet in length or less to 40 pots each and larger vessels are limited to 50 pots.

4) 5AAC 34.906, designates the Norton Sound Section to be a superexclusive registration area.

Statistical Summary

The total commercial catch was 10,661 crab (Table 21). A total of 29,684 pounds were harvested. This includes approximately 2,059 pounds of deadloss and 1,985 pounds of crab given away or kept for personal use. This is by far the smallest harvest since the small boat fishery began in 1993. Harvests were affected by poor price, and extreme weather conditions. Eight vessels made 50 deliveries, and 11 permit holders fished. Average weight for commercially caught crab was 2.78 lb./crab. A total of 360 pots were registered and 1,639 pot pulls were recorded during the fishery. The average price/pound was $1.47. The fishery value was approximately $41,000. This does not include deadloss and crab given away or kept for personal use.

Fish ticket reports document that 6 statistical areas were fished. Statistical area 636401 had the highest catch with 10,771 pounds taken or approximately 36.3% of the entire harvest. The second highest catch came from statistical area 626401 which was 8,065 lbs. or 27.2% of the harvest. The overall CPUE for the 1998 fishery was 6.5 crab/pot. Statistical area 626401 had the highest CPUE with 9.6 crab/pot (Table 21).

Statistical area 656401 had the largest average weight of 2.94 pounds per crab according to fish ticket data (Table 21). Overall average weight per crab for the 1998 season was 2.78 pounds. This compares to the combined average weight of 2.94 pounds of the previous five years.

Commercial Catch Sampling

Carapace length measurements and shell age were collected from 1,055 male red king crab throughout the duration of the 1998 summer fishery. Sampling was accomplished as the boats delivered their catch. Carapace age was classified as new (11 months old) or old (at least 23 months old). Overall mean carapace length of the legal male red king crab sampled was 116.9 mm.

Recruit king crab made up 32% of the harvested stock sampled during the 1998 commercial season (Appendix Table E2). Total postrecruits made up 68% of the harvested stock sampled. No sublegal male or female king crab information was collected from commercial vessels during the 1998 summer commercial king crab fishery. The small size of the vessels and the opportunistic excursion schedule made onboard sampling infeasible.

Tagged Crab

Three male crab with tags were returned to the ADF&G office during the 1998 summer commercial fishery. Only 2 of the tagged crab returned could be used to determine average growth per molt. The average growth per molt was 14.3 mm.

Enforcement

No Fish and Wildlife Protection officer was able to patrol the fishery. No cases were filed during 1998.

Norton Sound Winter Commercial Fishery

Regulation allows a winter commercial fishery in the Norton Sound Section from November 15 through May 15, the fishery typically takes place near Nome. The winter commercial fishery is required to take place from the ice, not from vessels. During the winter of 1997-1998, five commercial fishermen reported selling a total of 984 red king crab (Appendix Table E4). The villages east of Nome reported only limited harvests of crab. Ice conditions were generally unfavorable throughout Norton Sound, although the sea ice near Elim was fairly stable. Poor catch rates at Nome and unstable ice to the east kept king crab fishing to some of the lowest levels in recent years.

The harvest is divided between local residents who buy crab directly from the fishermen and other non-local markets such as Anchorage. Crab are sold in Nome for an average of eight dollars per crab, roughly $3.57 per pound. The 1997-1998 winter catch of 2,349 pounds was estimated to be worth about 8,386 dollars.

The winter crab fishermen generally use crab pots but some use handlines to "prospect". Deploying pots through sea ice is laborious, but hand lines can be dropped through a large ice auger hole in a short period of time. The other advantage of hand lines is that during periods of favorable weather hand lines may be deployed from new, less stable ice without the risk of loosing more expensive crab pots. Most fishermen consider commercial crabbing a sideline and hold other jobs. Usually, two or three of the winter crab fishermen sell the majority of the crab. Because the volume of crab involved is low, no processor has found it profitable to operate locally. The crab sold locally are all sold fresh as are those shipped to Anchorage or other non local markets. During the mid-winter months, fishermen find it difficult keeping the crab from freezing. Many Nome residents prefer to buy frozen crab since they are able to extract the meat prior to cooking. Fresh frozen crab are easily marketed in Nome, but are not accepted in Anchorage markets.

SUBSISTENCE FISHERY

Red king crab are utilized by Norton Sound residents mainly during the winter. Fishing occurs through cracks or holes cut in the ice with the use of handlines and pots. In order to

document trends in the subsistence harvest, the Board of Fisheries enacted a regulation in 1977 requiring subsistence fishermen in Norton Sound to obtain a permit prior to fishing and to record daily effort and catches on these permits.

The first year subsistence permits were required had the highest number of permits issued to date and a relatively high harvest rate were recorded. The fishery declined sharply the following year and remained at very depressed levels throughout the 1981-82 season. The lack of success in the winter crab fishery during some past years has been attributed to a declining crab population caused by the removal of crab in the summer commercial fishery together with low recruitment, low effort due to poor ice conditions, and changes in the nearshore winter distribution of crab. All these factors probably had some effect on the success of the winter fishery in varying degrees. During the 1978-79 winter fishery, the king crab population was still in relatively high abundance. Despite this relatively large population, winter catches were the poorest on record indicating that the major factors limiting winter catches were probably poor ice conditions and the distribution of crab. During the winter of 1981-82, poor winter catches could more reasonably be attributed to a declining crab population since the crab population was at a much lower level. Subsistence fishing success during the winters of 1982-83 through 1986-87 had improved due to a rebuilding of the population and increased use of more efficient gear (pots instead of handlines). Unstable ice conditions and record snowfalls adversely effected the 1987-88, 1988-89, and 1992-93 catches. During years of stable ice conditions, approximately 100 fishermen have averaged 100 crab each.

The 1997-1998 season was beset with poor ice conditions. Early in the winter season the sea ice to the west of Nome went out, taking the pot already deployed with it. Of the 73 permits returned, 64 reported fishing (Table 22). Fifty-eight fishers reported using pots, 8 reported using handlines, and 1 reported using a combination of the two gears. Permit data indicates the subsistence harvest consisted of 8,611 male crab and 11 female crab. Those fishers reported harvesting 45% of the male crab they caught and 1% of the females caught.

STOCK STATUS / RESEARCH

There has been a change in the character of the summer commercial fishery since 1993 due to regulation changes affecting pot limits, opening dates and a regulation making Norton Sound a superexclusive registration area. The quality and quantity of data collected since the 1993 summer crab fishery has differed greatly from previous years due to the nature of the small vessel fishery. No floating processor or catcher processor took part in the 1997 fishery, therefore no independent observers were onboard commercial vessels.

The ADF&G fishery monitor did not have the opportunity to make observations on small catcher vessels during the 1998 fishery. No information was collected on observed pot lifts, sublegal male and female length frequencies, and catch rates of legal and sublegal crab during the commercial fishery. However, sampling of the commercial catch did

occur on some deliveries made in Nome. This is important to ensure size limits are being enforced, and to assist management biologists to determine recruitment and health of the crab population.

Trawl assessment surveys were conducted in Norton Sound trienially between 1976 and 1991 by NMFS to provide distribution and abundance of demersal fish and invertebrates. Results from the six NMFS surveys, ADF&G Pot Surveys and the 1996 ADF&G trawl survey are summarized in Appendix Table E5. The 1991 survey was the last NMFS survey of the Norton Sound area; due to budgetary constraints, NMFS eliminated the Norton Sound area from the 1994 triennial survey. In 1995, ADF&G received funding for the Bering Sea Crab Stock Assessment Initiative (BSCSAI), a program primarily designed to provide population assessment surveys in areas that currently are unsurveyed or to improve the accuracy of existing survey estimates. The 1996 ADF&G trawl assessment survey was the first survey since the 1991 NMFS survey, and was the first ADF&G trawl survey of the area. Results are summarized in Fair (1997) and Fair (1998).

Pot surveys of the Norton Sound red king crab stock were conducted by ADF&G in 1980, 1981, 1982, and 1985 and were designed for two primary purposes: (1) to provide annual distribution, abundance and size class profiles during years that NMFS did not conduct assessment surveys; and (2). to provide preseason information to fishery managers regarding stock size and structure.

Population estimates for legal male crabs have fluctuated widely among trawl and pot surveys, from a high of 1.9 million crab in 1980 to a low of 0.3 million crab in 1982 (Appendix Table E5). In 1996, the estimated abundance of legal male crab was 536,235 red king. This population estimate showed a 40% decline in the legal biomass of king crab since 1991.

FUTURE INVESTIGATIONS

The trawl survey that occurred during the summer of 1996 in Norton Sound was made possible by a budget increment passed by the legislature. This is to be a regularly scheduled survey rotating between districts. Both funding for a sustained winter research program and a triennial trawl survey to evaluate Norton Sound crab populations were provided for in that legislation. A winter pot survey is planned during February, March, and April 1999 and the next trawl survey to generate a population estimate is planned for late summer 1999.

OUTLOOK FOR 1999

The guideline harvest is the same as the 1997 and 1998 seasons, 80,000 pounds. The Board of Fisheries approved a management strategy of a reduced harvest rate of 5% when legal biomass was estimated in the range of 1.5 to 3.0 million pounds. The long term goal

is to maintain a legal biomass above 3.0 million pounds and to sustain a harvest rate of 10% when in that range.

SECTION 4: MISCELLANEOUS SPECIES
(Includes Norton Sound,
Port Clarence and Kotzebue Districts)

SECTION 4 - MISCELLANEOUS SPECIES

INTRODUCTION

Several species other than salmon, crab and herring are utilized for commercial and subsistence purposes in the Norton Sound, Port Clarence and Kotzebue Districts. Primary species include inconnu or "sheefish" *(Stenodus leucichthys)*, whitefish *(Coregonus laurettae, Coregonus pidschian, Coregonus sardinella, Coregonus nasus, and Prosopium cylindraceum), (Coregonus sp., Prosopium sp.)*, Dolly Varden *(Salvelinus malma)*, and saffron cod *(Eleginus gracilis)*.

The fish are taken by set gillnets, beach seines, "jigging" through the ice, and rod and reel. Subsistence catches taken during the summer months are normally air dried, while winter catches are stored frozen. Fish are utilized both for human consumption and for dog feed. Fish taken for commercial purposes are mainly sold locally, although some are shipped from the area.

Subsistence harvest of most species is not limited by regulation. Commercial harvest may be prohibited in some freshwater areas, but limited commercial endeavors are allowed in many areas under terms of a permit.

INCONNU (Sheefish)

Introduction

The distribution of inconnu includes the Kobuk-Selawik River drainages, and Hotham Inlet of Kotzebue Sound and some Norton Sound drainages, but the largest populations and harvests occur within the former area (Figure 21). In the Kotzebue Sound area, adult fish migrate to upriver spawning areas after ice breakup and to wintering areas within the Hotham Inlet/Selawik Lake area during October-November. Although inconnu are capable of consecutive spawning, most fish spawn every two to three years. Inconnu mature slowly with males reaching maturity at 5-7 years of age and females at 7-11 years.

The inconnu's spawning and overwintering migration behavior makes them available for harvest by the various fisheries throughout their life cycle, and increases their vulnerability to overharvest. In addition, the inconnu's slow maturation rate increases the time required to restore depleted populations.

During the 1960's, age, sex and length data indicated stocks were being overharvested by the commercial and subsistence fisheries in the Kotzebue district. Consequently, an annual

area commercial harvest quota of 25,000 pounds of inconnu was instituted, although subsistence catches remained unrestricted.

Commercial Fishery

Most of the commercial fishing effort occurs near Kotzebue in Hotham Inlet. Fishermen use gillnets ranging from 5 1/2 inch - 7 inch stretched mesh which are set under the ice. Recorded commercial catches have remained relatively small; however, undocumented catches are believed to be significant and therefore, harvest totals should be considered minimum estimates. Restricted markets outside northwestern Alaska limit commercial activity greatly and most individuals who normally participate in the winter commercial fishery also fish for subsistence purposes. During some years, incidentally caught inconnu are also sold by commercial salmon fishermen when there is a market, but only in small amounts. There were no commercially sold sheefish reported in 1998 (Appendix Table F1).

Subsistence Fishery

Inconnu have long been utilized for subsistence purposes throughout the Kotzebue basin. Fishermen along the upper Kobuk River fish for inconnu during June through October, while the lower Kobuk and residents fish throughout much of the year. Kotzebue and Selawik fishermen fish in the Hotham Inlet and Selawik Lake during the winter months.

Appendix Table F2 estimates catches reported during the fall chum salmon subsistence surveys conducted by Subsistence Division, and for lower Kobuk River residents may include winter as well as summer and fall catches. In 1998 an estimated 5,350 sheefish were harvested by the Kobuk River communities. The mean harvests ranged from 5.6 sheefish in Kiana to 32.7 sheefish in Shungnak (Georgette and Utermohle, 1998). Subsistence sheefish harvest information was not collected for Kotzebue where a sizable ice fishery occurs for sheefish in late winter and spring. There is also no information concerning sheefish harvests in the Selawik area.

Escapement

In recent years aerial surveys have been conducted on key inconnu spawning areas incidental to the effort of enumerating salmon. These surveys have primarily been conducted along the upper Kobuk River in September. Survey conditions historically result in either very few or no inconnu being observed (Appendix Table F3). During these surveys, species identification has been a problem in some years. Surveys were not conducted in 1985 through 1990 due to high, turbid water, poor weather conditions, or lack of personnel. Incomplete escapement and catch data provide little basis for assessing the current population status of inconnu in the Kotzebue district, however there was some local concern that the inconnu stocks are declining.

Because of these concerns, a cooperative tagging project on sheefish in the Kotzebue District began in 1994. This study is being conducted by Sport Fish, U.S. Fish & Wildlife Service (USFWS) and the National Park Service (NPS). Spawning sheefish were tagged in the Upper Kobuk River and the Selawik River. Roughly 600 sheefish were tagged in the Kobuk River by Division of Sport Fish and 150 in the Selawik River by USFWS in 1994. During the fall of 1995, roughly 617 sheefish were tagged in the Upper Selawik River and approximately 1,386 sheefish in the Upper Kobuk River. In 1996, 2,300 were tagged in the Upper Kobuk and 500 in the Selawik Rivers. The Selawik River project ended in 1996. In 1997, 1,757 sheefish were tagged in the Upper Kobuk River. There are now approximately 6,520 tagged sheefish from the Kobuk River and 1,200 tagged sheefish from the Selawik River at large. The spawning population of sheefish in the Upper Kobuk was roughly 32,300 in 1995, 43,700 in 1996 and 26,782 in 1997. In the Selawik River, the spawning population estimate was 5,200 to 5,300 for both 1995 and 1996. Neither of these estimates account for the strong possibilities that females may be alternate year spawners. The results of the study should provide an estimate of the spawning sheefish populations, on migration patterns and to see if the two stocks mix in the over-wintering area of Kobuk and Selawik Lakes.

DOLLY VARDEN

Introduction

Dolly Varden *(Salvelinus malma)* are distributed throughout the Norton Sound, Port Clarence, and Kotzebue districts. Although taxonomists have disagreed on the distinguishing Dolly Varden characteristics and distribution of Arctic Char and Dolly Varden, most now agree that char in this area are the northern form of Dolly Varden. In order to eliminate confusion, in this report these fish will be referred to as Dolly Varden, the common name for this species complex.

Dolly Varden in this area are primarily nonconsecutive spawners and spawn throughout the late summer and fall. Fry emerge in the spring and migrate to the ocean during early summer after spending from 1 to 6 (generally 2-5) years in freshwater. Since Dolly Varden are a late-maturing fish (generally age 6-7), they are susceptible to overfishing by commercial, subsistence, and/or sport fisheries. Consequently, commercial fisheries have been maintained at low levels or prohibited to both reduce the potential of overharvest and provide for reproductive and subsistence fishery needs.

Commercial Fishery

Dolly Varden are taken as a non-target species in the directed Kotzebue commercial chum salmon fishery (Tables 10 and 11). Regulation changes in 1976, which closed the commercial salmon fishery on August 31, have reduced the harvest of Dolly Varden since Dolly Varden typically pass through the harvest area during September. Dolly Varden generally appear in commercial catches during the last three weeks of August. Reported

Dolly Varden catches are dependent upon available markets. The typical season catch when buyers are purchasing Dolly Varden is between 1,000 to 3,000 fish (Appendix Table F4). Spawning and over-wintering Dolly Varden (locally called trout) typically migrate along the northern shore of Kotzebue Sound during the third week of August. Even with a reduced number of fishermen and a concentration of their effort near town, the incidental catch of trout was well above average. There were 349 Dolly Varden sold with an average weight of 7.6 pounds. The commercial harvest has been as much as 7,700 but averages around 2,000. Historically two-thirds of the catch is taken on the north side of the district near Sheshalik

Subsistence Fishery

Dolly Varden are an important component in the diet of subsistence users in the Norton Sound-Kotzebue Sound areas. Subsistence fishermen catch Dolly Varden with seines in the fall, hook and line through the ice in the winter, and gillnets in the spring. The fall seine fishery contributes the greatest number of fish to the annual subsistence Dolly Varden harvest. Since 1962, seine catches made by the residents of Kivalina, within the Kotzebue District, have ranged from 7,000 to 49,000 Dolly Varden annually (Appendix Table F5)

In the Kotzebue District fall seine fishing is a group effort with several households comprising a fishing group. The catch is stored and allowed to freeze in willow cribs located near the seining site. These fish are used throughout the winter by the fishing group. It should be pointed out that the historical subsistence Dolly Varden catches that are summarized in Appendix Table F5 are very minimal figures due to the timing of the surveys conducted. Most Dolly Varden harvest take place prior to or just after freeze-up. The village of Noatak usually fishes prior to freeze-up, while the Kobuk River villages of Shungnak and Noorvik fish for Dolly Varden throughout the winter.

Information on Dolly Varden harvests were collected in Noatak as part of the post-season subsistence salmon harvest survey. In 1998, an estimated 3,872 Dolly Varden were harvest for subsistence by the community of Noatak (Appendix F5). The mean household harvest was 40 fish (Georgette and Utermohle, 1998). This was 19 % to 33 % less than the estimated 1995-97 Dolly Varden harvest (Georgette and Utermohle, 1998).

Most villagers in the Norton Sound District report incidental catches of Dolly Varden in their subsistence salmon nets. However, the bulk of the catch is taken by seining in the late fall.

Sport Fishery

Residents of the Kotzebue area and nonlocal residents on wilderness boating trips on the Kobuk and Noatak Rivers are the primary participants in the Dolly Varden sport fishery in the Kotzebue area watershed. Approximately 1,500 Dolly Varden are taken in this fishery annually (Sport Fish Division surveys).

Overwintering Counts

Aerial survey counts of overwintering Dolly Varden on the Wulik River have ranged from 297,257 Dolly Varden in 1969 to 30,923 Dolly Varden in 1984 (Appendix Table F6). Weather and water conditions have precluded flying aerial surveys during many years. When weather permits, the Division of Sport Fisheries conducts aerial surveys of the spawning grounds on the Noatak River in the summer and the overwintering areas of the Kivalina and Wulik Rivers in the fall. During the fall of 1998, no surveys were made on the Noatak or Kivalina Rivers. The Wulik River survey estimated 104,043 Dolly Varden in 1998 (Appendix Table F6).

WHITEFISH

Introduction

Although inconnu belong to the whitefish family, this section deals with several smaller species of the genera *Coregonus* and *Prosopium*. The genus *Coregonus* contains the "broad" and "humpback" whitefish or *C. nasus* and *C. pidschian*, respectively. In addition, three whitefish species known as "ciscoes" belong to this genera; ie., the least *cisco (C. sardinella)*, Arctic cisco *(C. autumnalis)* and Bering cisco *(C. laurettae)*. "Round" whitefish *(Prosopium cylindraceus)* are the sole representatives of the genus Prosopium in this area. All species normally spawn in the fall in freshwater.

Whitefish occur throughout most bodies of freshwater in the Norton Sound/Port Clarence/Kotzebue areas and can also be found in inshore marine waters at various times of the year. Whitefish are harvested to a very limited extent by the commercial and sport fisheries within the area, but are uniformly important to the various subsistence fisheries. Recently, there has been increasing interest in commercial development of this resource, especially in the Kotzebue District.

Commercial Fishery

Limited commercial whitefish harvests have been allowed since statehood, normally under the auspices of a permit which delineated harvest levels, open areas, legal gear, etc. Commercial whitefish fisheries have generally been limited to large open water areas (e.g. Grantley Harbor in the Port Clarence District) or ocean waters. Beach seines have been stipulated as legal gear in some instances in order to reduce the number of incidental species taken. Little comparative commercial catch and effort data have been recorded, but harvest levels have historically been low. A majority of the commercial catches have been made in Golovin Bay within the Norton Sound District, in the Kuzitrin River of the Port Clarence District, and in Hotham Inlet and Selawik River in the Kotzebue District. The fish have been sold to local markets for human consumption, dog food, or more recently, crab bait.

Subsistence Fishery

Whitefish have been taken mainly by beach seine or set gillnets. Catches are usually dried and used for human consumption or dog food. In some areas fish are "gutted" and dried early in the summer, while later in the summer the fish are filleted and dried with the eggs and viscera intact.

Subsistence catch enumeration is difficult since fishermen do not count fish individually, but by "tubs", "bags", "strings" or any other estimators of gross abundance. Additionally, many fish have been dried and consumed or stored in caches prior to the survey period. Reported subsistence harvests were generally the result of a limited and sporadic survey effort and should be regarded as minimum figures and not comparable from year to year. In 1997, subsistence harvests of whitefish were included for the first time in Division of Subsistence household salmon harvest surveys in Kotzebue Sound villages. An estimated 39,754 whitefish were harvested in 1998 for subsistence in Noatak and the Kobuk river villages (Appendix Table F7). Mean household harvests ranged from 42 whitefish in Ambler to 163 whitefish in Shungnak (Georgette and Utermohle, 1998).

Escapement

Whitefish escapements have not been monitored in the past, but there have been no indications from limited Department observations or fishermen interviews of declining populations.

SAFFRON COD

Saffron cod, or tomcod as they are called locally, are extensively utilized as a subsistence resource in the Norton Sound, Port Clarence and Kotzebue Districts. Tomcod are taken through the ice by jigging as well as with gillnets in open water and dipping through the ice in Unalakleet.

There has never been an extensive commercial fishery on tomcod in the Norton Sound, Port Clarence or Kotzebue areas. During 1980, one fisherman caught and sold 89 pounds (98 tomcod) in the Nome Subdistrict. There were no commercial landings during 1982. In 1983, one Nome area fisherman caught and sold 2,548 pounds (4,348 tomcod) and in 1989 one fisherman sold 1,800 pounds locally. These fish were used for dog food, crab bait and human consumption. No commercial deliveries were reported in during 1984-1993.

In 1994, Norton Sound Economic Development Corporation (N.S.E.D.C.) had provided a market for several fish species that had not been commercially utilized in the past. The need for crab bait was the primary factor in initiating the fishery at Unalakleet, where 1402 pounds were sold in seven deliveries in January and February of 1994. In 1995, the NSEDC market was not present which was likely a factor in the reduced harvest. The 1995

harvest totaled 52 pounds which sold for $.50 per pound with a total value of $26.00. No harvest was reported in 1996, 1997, and 1998.

MISCELLANEOUS FINFISH SPECIES

Other finfish species taken for subsistence in the Norton Sound-Port Clarence-Kotzebue area include: rainbow smelt (boreal smelt), capelin, northern pike, starry flounder, yellow fin sole, arctic flounder, Alaska plaice, grayling, burbot, Pacific herring in the fall time, and halibut (Appendix G1).

Subsistence utilization of these species has been documented although effort and catch vary widely in scale and importance with locality. Some of these species are important to the subsistence community in certain localities during specific seasons of the year.

Rainbow smelt, like saffron cod, had a limited commercial harvest at Unalakleet. During the January, February and March of 1994, 631 pounds of rainbow smelt were reported sold in nine deliveries for bait. The smelt and cod harvests from Unalakleet both occur in esturine areas. The Smelt were reported to be higher in the water column the cod. Either species could often be harvested from the same jigging site. Burbot, or freshwater cod, have been sold intermittently in the past in the Kotzebue, Port Clarence and Norton Sound Districts.

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Table 1. Norton Sound commercial salmon harvest summary by subdistrict, 1998.

		Subdistricts						Total
		1	2	3	4	5	6	Number
Number of Fishermen		0	16	23	0	28	52	82 [a]
Chinook	Number	0	1	105	0	910	6,413	7,429
	Weight(lbs.)		3	1,847		15,894	110,087	127,831
Sockeye	Number	0	0	0	0	0	7	7
	Weight(lbs.)						43	43
Coho	Number	0	3	1,462	0	3,624	24,534	29,623
	Weight(lbs.)		20	12,154		29,258	191,273	232,705
Pink	Number	0	106,761	145,669	0	236,171	99412	588,013
	Weight(lbs.)		246,444	324,068		539,608	220,504	1,330,624
Chum	Number	0	723	2,311	0	7,080	6,210	16,324
	Weight(lbs.)		4,937	13,651		46,197	41,902	106,687
Totals [b]	Number		107,488	149,547	0	247,785	136,576	641,396
	Weight(lbs.)		251,404	351,720	0	630,957	563,809	1,797,890

[a] Some fishermen fished more than one subdistrict.

[b] Totals do not include Salmon Roe sold.

Table 2. Nome area subsistence salmon catches, Norton Sound, 1998.

	Number of Permits			Number of Salmon Harvested					
	Issued	Returned	Fished	Chinook	Sockeye	Coho	Pink	Chum	Total
Marine Waters	83	45	27	12	12	418	1,906	747	3,095
Nome River	29	22	15	0	1	107	1,393	113	1,614
Snake River	9	4	1	0	0	3	23	4	30
Eldorado River	15	12	8	0	1	300	738	94	1,133
Flambeau Rive	9	5	3	3	0	165	0	2	170
Bonanza River	11	9	5	0	0	61	340	4	405
Safety Sound	3	1	0	0	0	0	0	0	0
Solomon River	8	6	5	0	0	3	397	0	400
Penny River	0	0	0	0	0	0	0	0	0
Cripple Creek	0	0	0	0	0	0	0	0	0
Sinuk River	0	0	0	0	0	0	0	0	0
Feather River	0	0	0	0	0	0	0	0	0
Fish River	0	0	0	0	0	0	0	0	0
Niukluk River	4	3	2	0	0	91	0	0	91
Port Clarence	0	0	0	0	0	0	0	0	0
Kuzitrin River	3	2	1	0	0	0	0	0	0
Pilgrim River	9	5	1	1	30	0	3	1	35
Unknown River	2	1	0	0	0	0	0	0	0
Total	185	115	68	16	44	1,148	4,800	965	6,973

Table 3. Salmon escapement indices of Norton Sound streams, 1998.

Stream Name	Chinook	Coho	Sockeye	Pink[a]	Chum[b]
Pilgrim Drainage (including Salmon Lake)	Average	Average	Above Avg.	Above Avg.	Below Avg.
Sinuk Drainage (including Glacial Lake)		Below Avg.	Well Below Avg.	Above Avg.	Below Avg.
Nome Subdistrict					
Cripple River				Above Avg.	Below Avg.
Penny River				Above Avg.	Average
Snake River		Average			Above Goal
Nome River		Average		Above Avg.	Below Goal
Flambeau River				Above Avg.	Below Goal
Eldorado River		Below Avg.		Above Avg.	Below Goal
Bonanza River		Average		Above Avg.	Below Goal
Solomon River		Average		Below Avg.	Below Goal
Fish River Drainage	Above Avg.	Below Avg.		Above Avg.	Above Goal
Kwiniuk River	Below Avg.	Below Avg.		Average	Above Goal
Tubutulik River	Above Avg.			Average	Average
Ungalik River	Above Avg.	Above Avg.		Above Avg.	Above Goal
Shaktoolik River	Below Avg.	Below Avg.		Average	Below Goal
Unalakleet River	Above Avg.	Below Avg.		Below Avg.	Below Goal

[a] Pink salmon have an odd/even year return cycle. Even year returns are much larger and are evaluated relative to other even year returns.

[b] Chum salmon are evaluated relative to average except when there is an established escapement goal.

Table 4. Commercial salmon set gillnet catches from Golovin, Subdistrict 2, Norton Sound, 1998.

				Period Catch and Catch Per Unit Effort								Cumulative Catch and Catch Per Uinit Effort							
Period	Pink Period	Hrs. Fished	Date	# FM	Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho	Coho CPUE	Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho	Coho CPUE
	1	24	7/18	4	0		23		2,818	29.35	0		0		23	0.24	2,818	29.35	0	
	2	24	7/19	14	1		188		32,220	95.89	0		1		211	0.24	35,038	81.11	0	
	3	24	7/20	13	0		183		26,026	83.42	0		1		394	0.18	61,064	41.04	0	
	4	24	7/21	12	0		127		20,529	71.28	1		1		521	0.13	81,593	26.35	1	
	5	24	7/22	11	0		111		18,429	69.81	1		1		632	0.10	100,022	19.29	2	
	6	24	7/23	6	0		91		6,739	46.80	1		1		723	0.08	106,761	14.83	3	
	7	12	7/24	No Deliveries									1		723	0.08	106,761		3	
Coho 1		24	8/1-8/2	No fishermen...	Poor weather								1		723	0.07	106,761		3	
Coho 2		24	8/3-8/4	1	0		0		63		7		1		723	0.06	106,824		10	

Total hours fished = 204
Total number of permits used = 16

Table 5. Commercial salmon set gillnet catches from Moses Point, Subdistrict 3, Norton Sound, 1998.

					Period Catch and Catch Per Unit Effort							Cumulative Catch and Catch Per Unit Effort							
Period	Pink Period	Hrs. Fished	Date	# FM	Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho	Coho CPUE	Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho	Coho CPUE
King 1		24	6/18-6/19	8	82	0	0		0		0		82	0	0		0		0	
	1	14	6/30/98	5	2		154		2,860	41	0		84		154	0	2,860	41	0	
	2	24	7/1/98	6	5		186		4,978	35	0		89		340	0	7,838	19	0	
	3	24	7/2/98	7	4		115		4,198	25	0		93		455	0	12,036	11	0	
	4	24	7/3/98	5	1		300		6,671	56	0		94		755	0	18,707	9	0	
	5	24	7/4/98	6	3		379		6,007	42	0		97		1,134	0	24,714	8	0	
	6	24	7/5/98	5	2		91		1,855	15	0		99		1,225	0	26,569	6	0	
	7	24	7/6/98	8	0		96		5,445	28	0		99		1,321	0	32,014	5	0	
	8	24	7/7/98	8	1		139		6,605	34	0		100		1,460	0	38,619	4	0	
	9	24	7/8/98	9	0		109		7,464	35	0		100		1,569	0	46,083	4	0	
	10	24	7/9/98	7	0		40		6,464	38	0		100		1,609	0	52,547	3	0	
	11	24	7/10/98	6	0		35		4,517	31	0		100		1,644	0	57,064	3	0	
	12	24	7/11/98	5	0		72		6,024	50	0		100		1,716	0	63,088	3	0	
	13	24	7/12/98	5	0		39		5,206	43	0		100		1,755	0	68,294	3	0	
	14	24	7/13/98	9	1		106		8,841	41	0		101		1,861	0	77,135	3	0	
	15	24	7/14/98	9	0		41		5,127	24	0		101		1,902	0	82,262	2	0	
	16	24	7/15/98	15	2		168		25,084	70	0		103		2,070	0	107,346	2	0	
	17	24	7/16/98	14	1		88		16,500	49	1		104		2,158	0	123,846	2	1	
	18	24	7/17/98	10	0		111		14,081	59	5		104		2,269	0	137,927	2	6	
	19	24	7/18/98	No Fishermen									104		2,269	0	137,927	2	6	
	20	24	7/19/98	4	0		20		3,877	40	1		104		2,289	0	141,804	2	7	
	21	24	7/20/98	No Fishermen									104		2,303	0	145,162	2	7	
	22	24	7/21/98	4	0		14		3,358	35	0		104		2,303	0	145,162	2	7	
	23	24	7/22/98	No Fishermen									104		2,303	0	145,669	2	7	
	24	24	7/23/98	1	0		0		507	21	0		104		2,303	0	145,669	2	7	
	25	12	7/24/98	No Fishermen									104		2,303	0	145,669	2	7	
Coho 2		24	8/3-8/4	No Fishermen									104		2,306	0	145,669		7	
Coho 3		24	8/5-8/6	4	0		3				563	6	105		2,311	0	145,669		570	3
Coho 4		24	8/7-8/8	9	1		5				892	4	105		2,311	0	145,669		1,462	2
Coho 5		24	8/10-8/11	No Fishermen... Poor weather									105		2,311	0	145,669		1,462	2
Coho 6		24	8/13-8/14	No Fishermen... Poor weather									105		2,311	0	145,669		1,462	1

Total hours fished = 722

Total number of permits used = 23

Table 6. Commercial salmon set gillnet catches from Shaktoolik, Subdistrict 5, Norton Sound, 1998.

					Period Catch and Catch Per Unit Effort								Cumulative Catch and Catch Per Unit Effort							
Period	Pink Period	Hrs. Fished	Date	# FM	Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho	Coho CPUE	Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho	Coho CPUE
King 1		24	6/15-6/16	14	222	0.66	3	0.01	-		0		222	0.66	3	0.01	0		0	
King 2		24	6/18-6/19	17	244	0.60	0	0.00	-		0		466	0.61	3	0.00	0		0	
King 3		24	6/25-6/26	18	319	0.74	8	0.02	-		0		785	0.68	11	0.00	0		0	
	1	12	6/28	9	1		41	0.38	4,651	43.06	0		786		52	0.01	4,651	43.06	0	
	2	6	6/29	11	9		100	1.52	5,115	77.50	0		795		152	0.02	9,766	27.13	0	
	3	24	6/30	18	19		334	0.77	17,617	40.78	0		814		486	0.05	27,383	17.16	0	
	4	24	7/1	17	5		755	1.85	17,523	42.95	0		819		1,241	0.09	44,906	12.37	0	
	5	24	7/2	11	14		898	3.40	19,137	72.49	0		833		2,139	0.11	64,043	10.78	0	
	6	24	7/3	14	2		120	0.36	7,523	22.39	0		835		2,259	0.09	71,566	7.85	0	
	7	24	7/4	15	12		329	0.91	12,418	34.49	0		847		2,588	0.09	83,984	6.41	0	
	8	24	7/5	14	9		633	1.88	16,102	47.92	0		856		3,221	0.09	100,086	5.67	0	
	9	24	7/6	16	3		720	1.88	16,312	42.48	1		859		3,941	0.09	116,398	5.01	1	
	10	24	7/7	18	6		272	0.63	11,321	26.21	0		865		4,213	0.08	127,719	4.25	1	
	11	24	7/8	15	2		139	0.39	9,722	27.01	0		867		4,352	0.07	137,441	3.72	1	
	12	24	7/9	17	3		285	0.70	22,868	56.05	0		870		4,637	0.06	160,309	3.55	1	
	13	24	7/10	15	23		196	0.54	12,758	35.44	0		893		4,833	0.06	173,067	3.23	1	
	14	24	7/11	15	5		323	0.90	16,984	47.18	0		898		5,156	0.05	190,051	3.03	1	
	15	24	7/12	3	1		90	1.25	4,112	57.11	0		899		5,246	0.05	194,163	2.83	1	
	16	24	7/13	14	2		140	0.42	8,286	24.66	1		901		5,386	0.05	202,449	2.58	2	
	17	24	7/14	18	2		485	1.12	21,654	50.13	2		903		5,871	0.05	224,103	2.47	4	
	18	24	7/15	3	1		147	2.04	5,038	69.97	0		904		6,018	0.04	229,141	2.35	4	
	19	24	7/16	4	0		130	1.35	3,104	32.33	0		904		6,148	0.04	232,245	2.21	4	
	20	24	7/17	5	0		230	1.92	3,123	26.03	1		904		6,378	0.04	235,368	2.08	5	
	21	24	7/18	2	0		0	0.00	570	11.88	0		904		6,378	0.04	235,938	1.96	5	
	22	24	7/19	2	0		42	0.88	233	4.85	0		904		6,420	0.04	236,171	1.85	5	
	23	24	7/20	No Fishermen									904		6,420	0.04	236,171		5	
	24	24	7/21	No Fishermen									904		6,420	0.03	236,171		5	
	25	24	7/22	No Fishermen									904		6,420	0.03	236,171		5	
	26	24	7/23	No Fishermen									904		6,420	0.03	236,171		5	
	27	12	7/24	No Fishermen									904		6,420	0.03	236,171		5	
Coho 4		24	7/27-7/28	7	1		139	0.83	-		355	2.11	905		6,559	0.03	236,171		360	2.14
Coho 5		48	7/30-8/1	3			49	0.34			136	0.94	905		6,608	0.03	236,171		496	0.69
Coho 6		48	8/3-8/5	No Fishermen									905		6,608	0.03	236,171		496	0.41
Coho 7		48	8/6-8/8	13	4		425	0.68			2654	4.25	909		7,033	0.03	236,171		3150	0.82
Coho 8		48	8/10-8/12	1	0		1	0.02			18	0.38	909		7,034	0.02	236,171		3168	0.61
Coho 9		48	8/13-8/15	No Fishermen...	Poor weather								909		7,034	0.02	236,171		3168	0.50
Coho 10		30	8/17-8/18	No Fishermen...	Poor weather								909		7,034	0.02	236,171		3168	0.45
Coho 11		24	8/19	No Fishermen...	Poor weather								909		7,034	0.02	236,171		3168	0.42
Coho 12		24	8/20	No Fishermen...	Poor weather								909		7,034	0.02	236,171		3168	0.39
Coho 13		24	8/21	6	0		22	0.15			135	0.94	909		7,056	0.02	236,171		3303	0.30
Coho 14		24	8/22	No Fishermen...	Poor weather								909		7,056	0.02	236,171		3303	0.28
Coho 15*		24	8/23	1	0		1	0.04			56	2.33	909		7,057	0.02	236,171		3359	0.26
Coho 16		24	8/24	1	0		7	0.29			62	2.58	909		7,064	0.02	236,171		3421	0.24
Coho 17		24	8/25	3	1		6	0.08			70	0.97	910		7,070	0.02	236,171		3491	0.22
Coho 18		24	8/26	4	0		10	0.10			133	1.39	910		7,080	0.02	236,171		3624	0.19
Coho 19		24	8/27	No Fishermen																
Coho 20		24	8/28	No Fishermen																
Coho 21		24	8/29	No Fishermen																
Coho 22		24	8/30	No Fishermen																
Coho 23		24	8/31	No Fishermen																

Total hours fished = 1272

Total number of permits used = 28

Table 7. Commercial salmon set gillnet catches from Unalakleet, Subdistrict 6, Norton Sound, 1998.

					Period Catch and Catch Per Unit Effort							Cumulative Catch and Catch Per Unit Effort							
Period	Pink Period	Hrs. Fished	Date	# FM	Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho	Coho CPUE	Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho	Coho CPUE
King 1		24	6/15-6/16	29	641	0.92	1	0.00	0		0		538	0.77	1	0.00	0		0	
King 2		24	6/18-6/19	32	754	0.98	8	0.01	0		0		1,395	1.00	9	0.00	0		0	
King 3		48	6/25-6/27	42	2,831	1.40	184	0.09	0		0		4,226	0.43	193	0.02	0		0	
	1	12	6/28/98	5	39		68	1.13	4,756	79.27	0		4,265		261	0.02	4,756	79.27	0	
	2	6	6/29/98	3	2		9	0.50	1,040	57.78	0		4,267		270	0.02	5,796	40.25	0	
	3	24	6/30/98	6	0		0		2,728	18.94	0		4,267		270	0.02	8,524	14.50	0	
	4	24	7/1/98	5	9		23	0.19	8,237	68.64	0		4,276		293	0.01	16,761	13.37	0	
King 4		48	6/29-7/1	38	1,375	0.75	287	0.16	0		0		5,651	0.26	580	0.02	16,761		0	
King 5		24	7/2-7/3	26	488	0.78	127	0.20	0		0		6,139	0.21	707	0.02	16,761		0	
	5	24	7/2/98	6	8		26	0.18	3,211	22.30	0		6,147		733	0.01	19,972	8.88	0	
	6	24	7/3/98	5	2		38	0.32	3,429	28.58	0		6,149		771	0.01	23,401	6.84	0	
	7	24	7/4/98	3	33		41	0.57	2,064	28.67	0		6,182		812	0.01	25,465	5.59	0	
	8	24	7/5/98	2	12		0		1,672	34.83	0		6,194		812	0.01	27,137	4.79	0	
	9	24	7/6/98	2	6		56	1.17	731	15.23	0		6,200		868	0.01	27,868	4.05	0	
	10	24	7/7/98	6	32		41	0.28	8,418	58.46	0		6,232		909	0.01	36,286	4.02	0	
	11	24	7/8/98	0	No fishermen...		Poor weather						6,232		909	0.01	36,286	3.61	0	
	12	24	7/9/98	9	8		37	0.17	4,425	20.49	0		6,240		946	0.01	40,711	3.03	0	
	13	24	7/10/98	15	20		97	0.27	9,318	25.88	2		6,260		1,043	0.01	50,029	2.65	2	
	14	24	7/11/98	5	9		29	0.24	2,740	22.83	0		6,269		1,072	0.01	52,769	2.40	2	
	15	24	7/12/98	8	8		52	0.27	6,097	31.76	0		6,277		1,124	0.01	58,866	2.23	2	
	16	24	7/13/98	14	16		29	0.09	10,164	30.25	6		6,293		1,153	0.01	69,030	2.07	8	
	17	24	7/14/98	18	17		158	0.37	8,703	20.15	9		6,310		1,311	0.01	77,733	1.84	17	
	18	24	7/15/98	13	21		261	0.84	6,594	21.13	23		6,331		1,572	0.01	84,327	1.68	40	
	19	24	7/16/98	13	8		78	0.25	4,484	14.37	23		6,339		1,650	0.01	88,811	1.51	63	
	20	24	7/17/98	7	5		94	0.56	3,750	22.32	11		6,344		1,744	0.01	92,561	1.42	74	
	21	24	7/18/98	8	13		134	0.70	4,821	25.11	25		6,357		1,878	0.01	97,382	1.34	99	
	22	24	7/19/98	2	4		70	1.46	916	19.08	2		6,361		1,948	0.01	98,298	1.27	101	
	23	24	7/20/98	No Fishermen									6,361		1,948	0.01	98,298	1.21	101	
	24	24	7/21/98	3	0		0		1,114	15.47	1		6,361		1,948	0.01	99,412	1.15	102	
	25	24	7/22/98	No Fishermen									6,361		1,948	0.01	99,412	1.10	102	
	26	24	7/23/98	No Fishermen									6,361		1,948	0.01	99,412	1.06	102	
	27	12	7/24/98	No Fishermen									6,361		1,948	0.01	99,412	1.04	102	
Coho 6		24	7/27-7/28	26	12		998	1.60	0		1,193	1.91	6,373		2,946	0.01	99,412		1,295	2.08
Coho 7		48	7/30-8/1	28	15		956	0.71	0		3,867	2.88	6,388		3,902	0.01	99,412		5,162	1.33
Coho 8		48	8/3-8/5	20	7		601	0.63	0		2,378	2.48	6,395		4,503	0.01	99,412		7,540	0.85
Coho 9		48	8/6-8/8	19	6		565	0.62			4,588	5.03	6,401		5,068	0.01	99,412		12,128	0.78
Coho 10		48	8/10-8/12	21	1		366	0.36			3,741	3.71	6,402		5,434	0.01	99,412		15,869	0.64
Coho 11		48	8/13-8/15	11	1		115	0.22			950	1.80	6,403		5,549	0.01	99,412		16,819	0.51
Coho 12		48	8/17-8/19	5	1		66	0.28			583	2.43	6,404		5,615	0.01	99,412		17,402	0.43
Coho 13		48	8/20-8/22	7	0		83	0.25			643	1.91	6,404		5,698	0.01	99,412		18,045	0.37
Coho 14		48	8/24-8/26	17	0		112	0.14			1,778	2.18	6,404		5,810	0.01	99,412		19,823	0.32
Coho 15		48	8/27-8/29	17	3		184	0.23			2,553	3.13	6,407		5,994	0.01	99,412		22,376	0.29
Coho 16		48	8/31-9/2	13	6		124	0.20			1,664	2.67	6,413		6,118	0.01	99,412		24,040	0.26
Coho 17		48	9/3-9/5	3	0		64	0.44			494	3.43	6,413		6,182	0.01	99,412		24,534	0.24

Total h ed = 738
Total n f permits used = 52
Additionally 7 sockeye commercially harvested.

Table 8. 1998 Norton Sound area subsistence salmon harvests.

			Chinook		Chum		Pink		Sockeye		Coho		Total	
	Total HH's	HH's Contacted	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total
Nome Permits[1]	167	104	15	15	964	964	4,797	4,797	14	14	1,057	1,057	6,847	6,847
Subdistrict 1	**167**	**104**	**15**	**15**	**964**	**964**	**4,797**	**4,797**	**14**	**14**	**1,057**	**1,057**	**6,847**	**6,847**
Golovin	47	38	70	86	829	1,023	4,415	5,446	14	17	495	611	5,823	7,184
Niukluk R. Permits[1]	4	3	0	0	0	0	0	0	0	0	91	91	91	91
White Mountain	65	39	64	98	567	870	5,146	7,894	13	20	388	603	6,178	9,486
Subdistrict 2	**115**	**79**	**134**	**184**	**1,396**	**1,893**	**9,561**	**13,340**	**27**	**37**	**961**	**1,292**	**12,079**	**16,747**
Elim	76	70	383	414	1,273	1,376	6,377	6,891	45	49	1,690	1,831	9,768	10,561
Subdistrict 3	**76**	**70**	**383**	**414**	**1,273**	**1,376**	**6,377**	**6,891**	**45**	**49**	**1,690**	**1,831**	**9,768**	**10,561**
Koyuk	74	63	583	684	5,278	6,192	1,713	2,009	0	0	331	388	7,905	9,274
Subdistrict 4	**74**	**63**	**583**	**684**	**5,278**	**6,192**	**1,713**	**2,009**	**0**	**0**	**331**	**388**	**7,905**	**9,274**
Shaktoolik	53	50	916	982	965	1,034	5,833	6,270	86	92	1,743	1,872	9,543	10,250
Subdistrict 5	**53**	**50**	**916**	**982**	**965**	**1,034**	**5,833**	**6,270**	**86**	**92**	**1,743**	**1,872**	**9,543**	**10,250**
Unalakleet[2]	216	204	3,735	3,963	2,404	2,551	12,414	13,173	189	201	6,883	7,303	25,625	27,191
Subdistrict 6	**216**	**204**	**3,735**	**3,963**	**2,404**	**2,551**	**12,414**	**13,173**	**189**	**201**	**6,883**	**7,303**	**25,625**	**27,191**
Stebbins	113	95	1,154	1,410	3,204	3,909	2,558	3,125	241	295	2,563	3,116	9,720	11,854
St. Michael	89	70	446	542	1,238	1,502	792	961	117	143	1,154	1,406	3,747	4,554
South Norton Sound	**202**	**165**	**1,600**	**1,952**	**4,442**	**5,411**	**3,350**	**4,086**	**358**	**438**	**3,717**	**4,522**	**13,467**	**16,408**
Gambell	149	141	72	72	431	432	910	914	265	265	392	393	2,070	2,077
Savoonga	131	116	28	28	179	179	449	452	118	118	333	335	1,107	1,111
St. Lawrence Island	**280**	**257**	**100**	**100**	**610**	**611**	**1,359**	**1,366**	**383**	**383**	**725**	**728**	**3,177**	**3,789**
NORTON SOUND	**1,184**	**993**	**7,466**	**8,294**	**17,332**	**20,032**	**45,404**	**51,933**	**1,102**	**1,214**	**17,120**	**19,007**	**88,424**	**100,480**

* Data from contacted households were expanded to households not contacted. If less than 30 and less than 50% of households in a community were contacted, then reported harvest is used for estimated harvest.

[1] Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, permit returns, 1998. Data not expanded.

[2] Estimated salmon harvest in Unalakleet includes 84 chinook, 200 chum, 340 pink, and 126 coho from the ADF&G test net fishery in addition to the survey results.

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, household surveys, 1998.

Table 9. 1998 Port Clarence subsistence salmon harvests.

	Total HH's	HH's Contacted	Chinook Reported Harvest	Chinook Est.* Total	Chum Reported Harvest	Chum Est.* Total	Pink Reported Harvest	Pink Est.* Total	Sockeye Reported Harvest	Sockeye Est.* Total	Coho Reported Harvest	Coho Est.* Total	Total Reported Harvest	Total Est.* Total
Brevig Mission	70	64	100	109	542	588	4,610	4,981	548	590	560	606	6,360	6,874
Pilgrim R. Permits[1]	12	7	1	1	1	1	3	3	30	30	0	0	35	35
Teller	75	74	178	178	2,024	2,033	2,820	2,831	1,073	1,075	1,151	1,153	7,246	7,270
PORT CLARENCE	**157**	**145**	**279**	**289**	**2,567**	**2,621**	**7,433**	**7,815**	**1,651**	**1,696**	**1,711**	**1,759**	**13,641**	**14,179**

* Data from contacted households were expanded to households not contacted. If less than 30 and less than 50% of households in a community were contacted, then reported harvest is used for estimated harvest.

[1] Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, permit returns, 1998. Data not expanded.

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, household surveys, 1998.

Table 10. Commercial catches of chum salmon, chinook salmon, and Dolly Varden by period in the Kotzebue District, 1998.

Period	Date	Hours Fished	Number of Fishermen	Catch Rate (chum)	Chum			Chinook			Dolly Varden		
					Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.
1	9-Jul-98	12	7	3.6	304	2,432	8.0	4	56	14.0	0		
2	10-Jul-98	12	6	8.0	574	4,592	8.0	6	114	19.0	0		
3	13-Jul-98	12	10	15.6	1,874	14,992	8.0	10	145	14.5	4	33	8.3
4	14-Jul-98	12	9	12.4	1,340	10,720	8.0	4	64	16.0			
5	16-Jul-98	12	12	13.4	1,923	15,384	8.0	28	397	14.2	8	68	8.5
6	17-Jul-98	12	5	10.4	622	4,976	8.0	1	22	22.0	3	22	7.3
7	20-Jul-98	12	13	11.5	1,787	14,296	8.0	21	288	13.7	3	34	11.3
8	21-Jul-98	12	12	24.0	3,458	27,664	8.0	25	357	14.3	16	125	7.8
9	23-Jul-98	12	22	15.6	4,109	32,872	8.0	16	221	13.8	16	131	8.2
10	24-Jul-98	12	19	12.4	2,833	22,664	8.0	11	165	15.0	7	45	6.4
11	27-Jul-98	12	26	11.6	3,605	28,840	8.0	14	168	12.0	23	165	7.2
12	28-Jul-98	12	25	11.6	3,491	27,928	8.0	10	132	13.2	15	104	6.9
13	29-Jul-98	12	26	13.7	4,279	34,232	8.0	5	75	15.0	6	46	7.7
14	30-Jul-98	12	26	11.6	3,622	28,976	8.0	18	257	14.3	19	149	7.8
15	31-Jul-98	12	22	9.3	2,467	19,736	8.0	1	23	23.0	8	54	6.8
16	3-Aug-98	12	20	8.5	2,035	16,280	8.0	10	143	14.3	20	149	7.5
17	4-Aug-98	12	20	13.6	3,257	26,056	8.0	4	58	14.5	15	109	7.3
18	5-Aug-98	12	25	13.3	3,992	31,936	8.0	7	83	11.9	37	297	8.0
19	6-Aug-98	12	2	35.0	841	6,728	8.0	1	7	7.0	3	21	7.0
20	7-Aug-98	12	19	10.2	2,330	18,640	8.0	2	16	8.0	11	82	7.5
21	10-Aug-98	12	17	14.7	2,998	23,984	8.0	9	139	15.4	11	72	6.5
22	11-Aug-98	12	14	12.0	2,018	16,144	8.0	3	41	13.7	10	71	7.1
23	13-Aug-98	12	5	13.5	809	6,472	8.0	0	0	0.0	0	0	
24	14-Aug-98	12	2	12.3	294	2,352	8.0	0	0	0.0	0	0	
25	17-Aug-98	12	2	5.9	142	1,136	8.0	0	0	0.0	18	164	9.1
26	18-Aug-98	12	7	10.8	903	7,224	8.0	0	0	0.0	96	699	7.3
Totals		312			55,907	447,256	8.0	210	2,971	14.1	349	2,640	7.6

Table 11. Kotzebue District commercial chum salmon, chinook salmon, and Dolly Varden catch by statistical area, 1998.

		Chum	Chinook	Dolly Varden
Statistical Area	Number of Fishermen	Number	Number	Number
331-01	43	34,892	81	236
331-02	15	9,648	58	89
331-03	5	933	0	4
331-04	6	2,718	5	0
331-05	3	288	4	2
331-06	11	7,428	62	18
Total	45	55,907	210	349

Table 12. Kotzebue District 1998 commercial and 19 year average catch statistics (1979-1997).

19 Year Avg.

Period	Hours	Number Permits	Catch (x 1,000)	CPUE	Prop. Catch	Cumulative Catch (x 1,000)	Cumulative CPUE	Cumulative Prop. Catch
1	24	35	3.142	4.5	0.011	3.142	4.5	0.011
2	23	59	5.231	6.3	0.018	8.373	6.3	0.029
3	23	82	9.992	7.5	0.034	18.365	7.5	0.063
4	24	101	17.649	9.2	0.060	36.014	9.2	0.123
5	26	110	21.557	10.1	0.074	57.571	10.1	0.196
6	27	116	28.436	15.1	0.097	86.006	15.1	0.293
7	31	119	34.312	14.7	0.117	120.318	14.7	0.411
8	35	130	37.305	13.8	0.127	157.624	13.8	0.538
9	37	117	36.156	14.5	0.123	193.780	14.5	0.661
10	35	124	40.713	15.7	0.139	234.492	15.7	0.800
11	38	114	23.702	8.7	0.081	258.194	8.7	0.881
12	37	95	14.540	12.8	0.050	272.734	12.8	0.931
13	37	73	9.972	6.2	0.034	282.705	6.2	0.965
14	36	54	7.184	6.2	0.025	289.889	6.2	0.989
15	36	35	3.179	4.8	0.011	293.068	4.8	1.000

1998

Period	Hours	Number Permits	Catch (x 1,000)	CPUE	Prop. Catch	Cumulative Catch (x 1,000)	Cumulative CPUE	Cumulative Prop. Catch
1	24	6.5	0.878	5.6	0.016	0.878		0.016
2	24	9.5	3.214	14.1	0.057	4.092		0.073
3	24	8.5	2.545	12.5	0.046	6.637		0.119
4	24	12.5	5.245	17.5	0.094	11.882		0.213
5	24	20.5	6.942	14.1	0.124	18.824		0.337
6	36	25.5	11.375	12.4	0.203	30.199		0.540
7	24	24	6.089	10.6	0.109	36.288		0.649
8	36	21.5	9.284	12.0	0.166	45.572		0.815
9	24	10.5	3.171	12.6	0.057	48.743		0.872
10	24	15.5	5.016	13.5	0.090	53.759		0.962
11	24	3.5	1.103	13.1	0.020	54.862		0.981
12	24	4.5	1.045	9.7	0.019	55.907		1.000
13	0	0			0.000	55.907		1.000
14	0	0			0.000	55.907		1.000
15	0	0			0.000	55.907		1.000

Table 13. Historical average age composition by period for the recent 19 years (1979-1997) and 1998.

19 Year Average

Period	Catch	Percent				Catch by Age			
		3	4	5	6	3	4	5	6
1	3,142	0.4	31.8	62.2	5.6	13	999	1,954	176
2	5,231	0.8	39.7	54.5	5.0	42	2,077	2,851	262
3	9,992	1.3	39.8	53.0	5.9	130	3,977	5,296	590
4	17,649	1.2	48.4	46.5	3.9	212	8,542	8,207	688
5	21,557	1.3	46.5	46.9	5.2	280	10,024	10,110	1,121
6	28,436	1.8	53.0	42.2	2.9	512	15,071	12,000	825
7	34,312	2.6	57.1	37.5	2.8	892	19,592	12,867	961
8	37,305	4.0	60.2	33.6	2.2	1,492	22,458	12,535	821
9	36,156	5.1	58.8	33.4	2.7	1,844	21,260	12,076	976
10	40,713	5.3	62.0	31.1	1.7	2,158	25,242	12,662	692
11	23,702	9.5	65.0	24.1	1.4	2,252	15,406	5,712	332
12	14,540	11.0	60.3	26.8	2.0	1,599	8,767	3,897	291
13	9,972	9.9	61.5	26.3	2.3	987	6,132	2,623	229
14	7,184	9.4	61.3	28.0	1.3	675	4,404	2,012	93
15	3,179	4.4	66.6	27.6	1.4	140	2,117	877	44

Kotzebue Sound commercial catch and age composition, 1998.

Period	Catch	Percent				Catch by Age			
		3	4	5	6	3	4	5	6
1	878	0.4	39.2	37.2	22.8	4	344	327	200
2	3,214	0.9	29.3	44.9	24.4	29	942	1,443	784
3	2,545	0.4	42.1	38.6	17.8	10	1,071	982	453
4	5,245	0.4	49.4	32.3	16.3	21	2,591	1,694	855
5	6,942	2.0	51.0	32.9	13.3	139	3,540	2,284	923
6	11,375	2.8	49.4	32.8	15.0	319	5,619	3,731	1,706
7	6,089	4.0	54.0	33.2	8.4	244	3,288	2,022	511
8	9,284	6.6	52.2	24.2	15.9	613	4,846	2,247	1,476
9	3,171	8.0	65.1	18.4	8.4	254	2,064	583	266
10	5,016	14.9	62.4	14.5	7.8	747	3,130	727	391
11	1,103	33.3	52.6	11.5	2.6	367	580	127	29
12	1,045	23.1	49.0	22.4	5.4	241	512	234	56
13	0					0	0	0	0
14	0					0	0	0	0
15	103	17.5	60.2	18.4	3.9	18	62	19	4

Table 14. Kobuk River chum salmon drift test fish mean daily and cumulative CPUE, 1993-1998.

	1993		1994		1995		1996		1997		1998	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
05-Jul												
06-Jul												
07-Jul												
08-Jul												
09-Jul							12.77	12.77	5.85	5.85		
10-Jul							15.00	27.77	0.00	5.85	5.22	5.22
11-Jul							98.38	126.15	5.31	11.16	0.85	6.07
12-Jul	11.18	11.18			0.00	0.00	45.54	171.69	7.19	18.35	[a]	6.07
13-Jul	14.22	25.40	0.00	0.00	0.93	0.93	74.29	245.98	[a]	18.35	15.89	21.96
14-Jul	20.57	45.97	2.68	2.68	2.80	3.73	[a]	245.98	6.25	24.60	7.53	29.49
15-Jul	35.08	81.05	2.58	5.26	2.77	6.50	83.75	329.73	3.65	28.25	14.07	43.56
16-Jul	13.19	94.24	11.35	16.61	[a]	6.50	71.35	401.08	14.28	42.53	17.33	60.89
17-Jul	17.27	111.51	[a]	16.61	0.00	6.50	55.49	456.57	15.17	57.70	5.07	65.96
18-Jul	[a]	111.51	7.16	23.77	1.81	8.31	89.86	546.43	16.12	73.82	9.02	74.98
19-Jul	10.71	122.22	12.40	36.17	9.89	18.20	54.74	601.17	17.98	91.80	[a]	74.98
20-Jul	2.76	124.98	3.65	39.82	16.30	34.50	63.70	664.87	[a]	91.80	18.66	93.64
21-Jul	3.20	128.18	7.30	47.12	38.54	73.04	52.12	716.99	18.53	110.33	11.87	105.51
22-Jul	5.52	133.70	3.56	50.68	21.18	94.22	50.97	767.96	13.28	123.61		105.51
23-Jul	27.15	160.85	16.49	67.17	50.58	144.80	91.36	859.32	10.79	134.40	29.58	135.09
24-Jul	9.06	169.91	[a]	67.17	28.46	173.26	91.89	951.21	22.86	157.26	27.33	162.42
25-Jul	[a]	169.91	14.38	81.55	40.16	213.42	76.80	1,028.01	21.57	178.83	24.68	187.10
26-Jul	15.22	185.13	47.65	129.20	35.15	248.57	55.68	1,083.69	14.66	193.49	[a]	187.10
27-Jul	8.06	193.19	40.66	169.86	63.94	312.51	29.79	1,113.48	18.46	211.95	23.91	211.01
28-Jul	16.36	209.55	57.83	227.69	62.49	375.00	49.06	1,162.54	30.53	242.48	51.91	262.92
29-Jul	0.93	210.48	33.62	261.31	46.11	421.11	70.13	1,232.67	28.13	270.61	34.16	297.08
30-Jul	0.92	211.40	69.21	330.52	57.86	478.97	35.29	1,267.96	22.33	292.94	24.59	321.67
31-Jul	12.58	223.98	[a]	330.52	29.89	508.86	82.27	1,350.23	32.57	325.51	15.69	337.36
01-Aug	[a]	223.98	82.16	412.68	72.91	581.77	167.67	1,517.90	41.41	366.92	25.44	362.80
02-Aug	6.74	230.72	65.12	477.80	48.71	630.48	62.02	1,579.92	22.41	389.33	[a]	362.80
03-Aug	54.49	285.21	71.79	549.59	48.40	678.88	48.7	1,628.62	35.21	424.54	26.67	389.47
04-Aug	44.23	329.44	108.98	658.57	53.00	731.88	65.93	1,694.55	26.67	451.21	42.35	431.82
05-Aug	89.30	418.74	59.74	718.31	49.95	781.83	60.33	1,754.88	24.47	475.68	8.57	440.39
06-Aug	18.60	437.34	102.56	820.87	[a]	781.83	80.47	1,835.35	42.25	517.93	6.00	446.39
07-Aug	20.52	457.86	[a]	820.87	46.39	828.22	90.99	1,926.34	36.00	553.93	5.11	451.50
08-Aug	[a]	457.86	62.75	883.62	44.02	872.24	146.94	2,073.28	45.07	599.00	16.40	467.90
09-Aug	1.84	459.70	96.86	980.48	68.22	940.46	106.11	2,179.39	55.14	654.14	17.20	485.10
10-Aug	12.63	472.33	45.83	1,026.31	56.33	996.79	56.95	2,236.34	[a]	654.14	9.46	494.56
11-Aug	18.11	490.44	57.02	1,083.33	37.95	1,034.74	[a]	2,236.34	43.45	697.59	10.29	504.85
12-Aug	3.74	494.18	90.54	1,173.87	63.92	1,098.66	72.29	2,308.63	37.36	734.95	19.44	524.29
13-Aug			11.36	1,185.23	[a]	1,098.66	114.63	2,423.26	45.93	780.88	10.21	534.50
14-Aug			[a]	1,185.23	29.35	1,128.01	158.13	2,581.39	16.01	796.89	3.85	538.35
15-Aug			5.13	1,190.36	25.26	1,153.27					0	538.35
16-Aug			16.23	1,206.59	35.04	1,188.31						
17-Aug			0.00	1,206.59								
18-Aug			0.00	1,206.59								
19-Aug			3.12	1,209.71								
20-Aug			0.00	1,209.71								
21-Aug			[a]	1,209.71								
22-Aug			0.00	1,209.71								
23-Aug			0.00	1,209.71								
24-Aug			0.00	1,209.71								
25-Aug			0.91	1,210.62								
26-Aug			5.56	1,216.18								
27-Aug			1.86	1,218.04								
28-Aug			0.93	1,218.97								
29-Aug			0.00	1,218.97								
30-Aug			0.00	1,218.97								

[a] Regular day off.

Table 15. 1998 Kotzebue Sound subsistence salmon harvests.

			Chinook		Chum		Pink		Sockeye		Coho		Total	
	Total HH's	HH's Contacted	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total
Ambler	80	73	0	0	2,208	2,432	2	2	2	2	0	0	2,212	2,437
Kiana[1]	102	88	27	29	3,196	3,414	6	6	0	0	16	17	3,245	3,466
Kobuk	25	25	0	0	1,031	1,031	0	0	0	0	0	0	1,031	1,031
Kotzebue[2]	790	157	65	327	4,962	24,968	373	1,877	77	387	52	262	5,529	27,821
Noatak	97	90	5	5	2,496	2,614	6	6	2	2	0	0	2,509	2,627
Noorvik	129	109	19	21	8,685	9,845	198	224	0	0	124	140	9,026	10,230
Shungnak	56	50	0	0	4,222	4,676	0	0	0	0	38	42	4,260	4,718
Kotzebue Sound	**1,279**	**592**	**116**	**383**	**26,800**	**48,979**	**585**	**2,116**	**81**	**392**	**230**	**461**	**27,812**	**52,330**

* Data from households were expanded to households not contacted. If less than 30 and less than 50% of households in a community were contacted, then reported harvest is used for estimated harvest.

[1] Estimate chum salmon harvest in Kiana includes 630 chum from the ADF&G test net fishery in addition to the survey results.

[2] Alaska Department of Fish and Game, Division of Subistence, postcard survey, 1998. Estimated salmon harvest includes 408 chum from the ADF&G test net fishery in addition to the survey results.

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, household surveys, 1998.

Table 16. Daily observed peak biomass estimates of Pacific herring, Norton Sound District, 1998

Date	Flight No.	Observer Initials	Survey		Spawn		Estimated Biomass (ST) By Index Area							
			Hours	Rating	No.	Length (mi)	KLK	UNK	CDB	NTB	ELM	GOL	NOM	TOTAL
5/12/98	1	CL&FB	1.5	4	0	0.0	0.0	0.0	0.0					0.0
5/18/98	2	CL&TK	0.9	4	0	0.0		0.0	0.0					0.0
5/19/98	3	CL&TK	1.9	4	9	0.1	22.8	0.0	0.0					22.8
5/20/98	4	CL&TK	3.1	4	51	2.2	219.0	0.0	159.9	0.0	0.0			378.9
5/21/98	5	FB&TK	1.6	4	0	0.0		0.0	372.8		0.0			372.8
5/22/98	6	CL&TK	0.9	5	0	0.0	0.0	0.0						0.0
5/23/98	7	CL&TK	3.2	4	0	0.0	121.2	0.0	117.0	0.0	1.5			239.7
5/24/98	8	FB	2.3	5	11	0.3	328.1	0.0	1323.5					1651.6
5/25/98	9A	CL	3.5	5	150	23.5	22.8	0.0	4471.8	48.0	12.9	48.0		4603.5
5/25/98	9B	FB			*172	*18.8	63.8	0.0	3315.7	0.0	12.9	48.0		3440.4
5/26/98	10A	CL	2.5	4	166	16.0	1002.1	0.0	3579.2					4581.3
5/26/98	10B	FB			*163	*11.5	708.0	0.0	2882.8					3590.8
5/27/98	11A	CL	3.9	5	48	2.4	1446.7	1917.5	1980.9	28.3	121.7	357.7		5852.8
5/28/98	12	FB	2.4	5	31	1.4	1639.8	0.0	73.8					1713.6
5/29/98	13	CL	3.4	5	14	0.5	434.9	6695.9	0.0	0.0	113.0	0.0		7243.8
5/30/98	14	CL	2.3	4	0	0.0		0.0	11135.5	15.2	649.2	330.2		12130.1
6/1/98	15	CL&FB	3.5	5	13	0.6	2605.2	0.0	0.0	0.0	322.7			2927.9
6/2/98	16	CL	3.5	5	14	1.9	1809.7	0.0	716.1	0.0	1134.1	47.0		3706.9
6/4/98	17	CL	5.0	5	1	0.1	365.1	16884.9	17464.0	59.3	273.8	13.7	59.3	35120.1
6/6/98	18	FB	1.5	4	19	0.8	812.1	8484.6	0.0	0.0	0.0	0.0	0.0	9296.7
6/8/98	19	CL&FB	3.5	4	0	0.0	0.0	34444.0	9468.0	0.0	3068.9	1206.1	1276.7	49463.7
6/12/98	20	C.L.	1.8	5	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	82.1	82.1
Sum			50.4	4	527.0	49.8			Waste		Harvest	917.0	Total Harvest	2569.5
							1639.8	0	11135.5	15.2	649.2	330.2	Survey	49463.7
													Biomass	52033.2
													Exploit%	4.938%

Biomass includes combined Total Harvest, Waste, and Peak Survey Estimate.
9.1 tons of herring was sighted in the PortClarence District 6/12/98
* Counts by the second observer not included in cumulative total.

Table 17. Norton Sound herring spawn estimates by subdistrict (s.d.), 1998.

Date	s.d. 1		s.d. 2		s.d. 3		s.d. 4		s.d. 5		s.d. 6		s.d. 7		Totals	
	#	Miles	#	Miles	#	Miles	#	Miles	#	Miles	#	Miles	#	Miles	#	Miles
5/12/98	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
5/18/98	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
5/19/98	9	0.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	9	0.1
5/20/98	51	2.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	51	2.2
5/21/98	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
5/22/98	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
5/23/98	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
5/24/98	11	0.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	11	0.3
5/25/98	150	23.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	150	23.5
5/26/98	166	16.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	166	16.0
5/27/98	48	2.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	48	2.4
5/28/98	31	1.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	31	1.4
5/29/98	13	0.4	0	0.0	1	0.1	0	0.0	0	0.0	0	0.0	0	0.0	14	0.5
5/30/98	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
6/1/98	12	0.5	1	0.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	13	0.6
6/2/98	14	1.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	14	1.9
6/4/98	1	0.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.1
6/6/98	19	0.8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	19	0.8
6/8/98	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
6/12/98	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	525	49.6	0	0	1	0.1	0	0	0	0	0	0	0	0.0	527	49.8

Table 18. Sac roe herring harvest and effort by date and subdistrict, Norton Sound District, 1998. [a]

	Subdistrict 1 (333-70)			Subdistrict 3 (333-74)			TOTALS		
Date	Number Fishermen	Daily Catch (st)	Daily Roe %	Number Fishermen	Daily Catch (st)	Daily Roe %	Number Fishermen	Daily Catch (st)	Daily Roe %
5/22	12	49.8	7.9				12	49.8	7.90
5/24	12	59.9	9.1				12	59.9	9.07
5/25	28	565.1	9.1	5	82.1	8.2	33	647.2	8.90
5/26	11	180.8	8.9				11	180.8	8.90
5/27	13	174.4	8.9				13	174.4	8.87
5/29				9	87.4	8.4	9	87.4	8.42
5/30									
5/31									
6/1				11	203.2	9.2	11	203.2	9.23
6/2	6	57.4	10.7	12	438.0	9.0	18	495.4	9.20
6/3	10	231.5	10.5	5	116.3	10.1	15	347.8	10.32
6/4	10	223.8	9.2				10	223.8	9.20
6/5				4	15.5	10.2	4	15.5	10.22
6/6				5	41.8	8.6	5	41.8	8.61
6/7				1	42.5	9.9	1	42.5	9.90
6/8				1	10.5	9.7	1	10.5	9.70
6/9				4	43.6	9.7	4	43.6	9.68
Total:	29	1,542.7	9.3	20	1080.9	9.1	35	2,623.6	9.20

[a] Gillnets were the only gear used to harvest herring.

Table 19. Norton Sound herring harvest by subdistrict, by gear type, 1998.

		Gill Net				Spawn on Kelp	
Subdistrict	Location	Sac Roe (st)	Avg. Roe %	Bait (st)	# fishers	Pounds of Kelp	# fishers
333-70 SD 1	Canal Point-Spruce Creek	1,542.7	9.3	0	29	18,083 [a]	11
333-74 SD 3	Junction Creek-Island Point	1,080.9	9.1	0	20		
333-80 SD 7	Rocky Point-Cape Douglas			7.8	1		

[a] Include 2,100 lbs of wild kelp and 16,083 lbs of *Macrocystis* kelp.

Table 20. Port Clarence District commercial herring fishing history.

Year	Fishery	Effort	Harvest	Price	Value
1986	Fall Bait	1 Permit (G/N)	130 lbs.	$1.00/lb	$ 130
1987	Sac Roe	3 Purse Seiners 3 Gillnetters	145.5 st	$800/st@10%	$ 77,466
1987	Fall Bait	Unknown # of Permits (G/N)	1,100 lbs	$.30/lb	$ 330
1988	Sac Roe	3 Purse Seiners	56.4 st @7.6%		
		3 Gillnetters	23.6 st @8.9%		
		Combined Total	80.0 st @8.2%	$1000/st @10%	$ 57,500
1994	Fall Bait	4 Permits (G/N)	8,706 lbs	$.45/lb	$ 3,917
1995	Spring Bait	8 Permits (G/N)	19,193 lbs	$.61/lb	$ 11,625
	Fall Bait	2 Permits (G/N)	9,119 lbs	$.37/lb	$ 3,393
		Combined Total	28,312 lbs	$.53/lb	$ 15,018
1996	Spring Bait	4 Permits	5,546 lbs	$.40/lb	$ 2,218

Table 21. Commercial harvest of red king crab from Norton Sound Section by statistical area, Norton Sound District, 1998 (summer fishery only).

Statistical Area	Total Harvest Number	Total Harvest Pounds	Total Pots Lifted	Average Crab/Pot	Average Weight
626401	2,825	8,065	293	9.6	2.85
636330	928	2,449	182	5.1	2.64
636401	3,799	10,771	452	8.4	2.84
646401	1,164	3,194	263	4.4	2.74
656330	1,562	4,078	370	4.2	2.61
656401	383	1,127	79	4.8	2.94
Totals	10,661	29,684	1,639	6.5	2.78

Table 22. Winter 1997-98 subsistence red king crab catches and effort by gear type, Norton Sound area.

Gear Type	# Permits Fished[a]	# Males Caught	# Males Kept	# Females Caught	# Females Kept	Total Crab Captured	Total Crab Kept	Average Harvest per Fisherman
Pots	58	18,832	8,567	1,233	11	20,065	8,578	148
Handlines	8	37	28	0	0	37	28	4
Both	1	206	16	19	0	225	16	16
Unknown	0	0	0	0	0	0	0	0
Totals	64	19,075	8,611	1,252	11	20,327	8,622	135

Number of Permits given out 94
Number of Permits returned 73

[a] Some fishers use both handlines and pots to harvest crab.

Figure 1. Commercial salmon fishing districts and subdistricts in Norton Sound and Port Clarence.

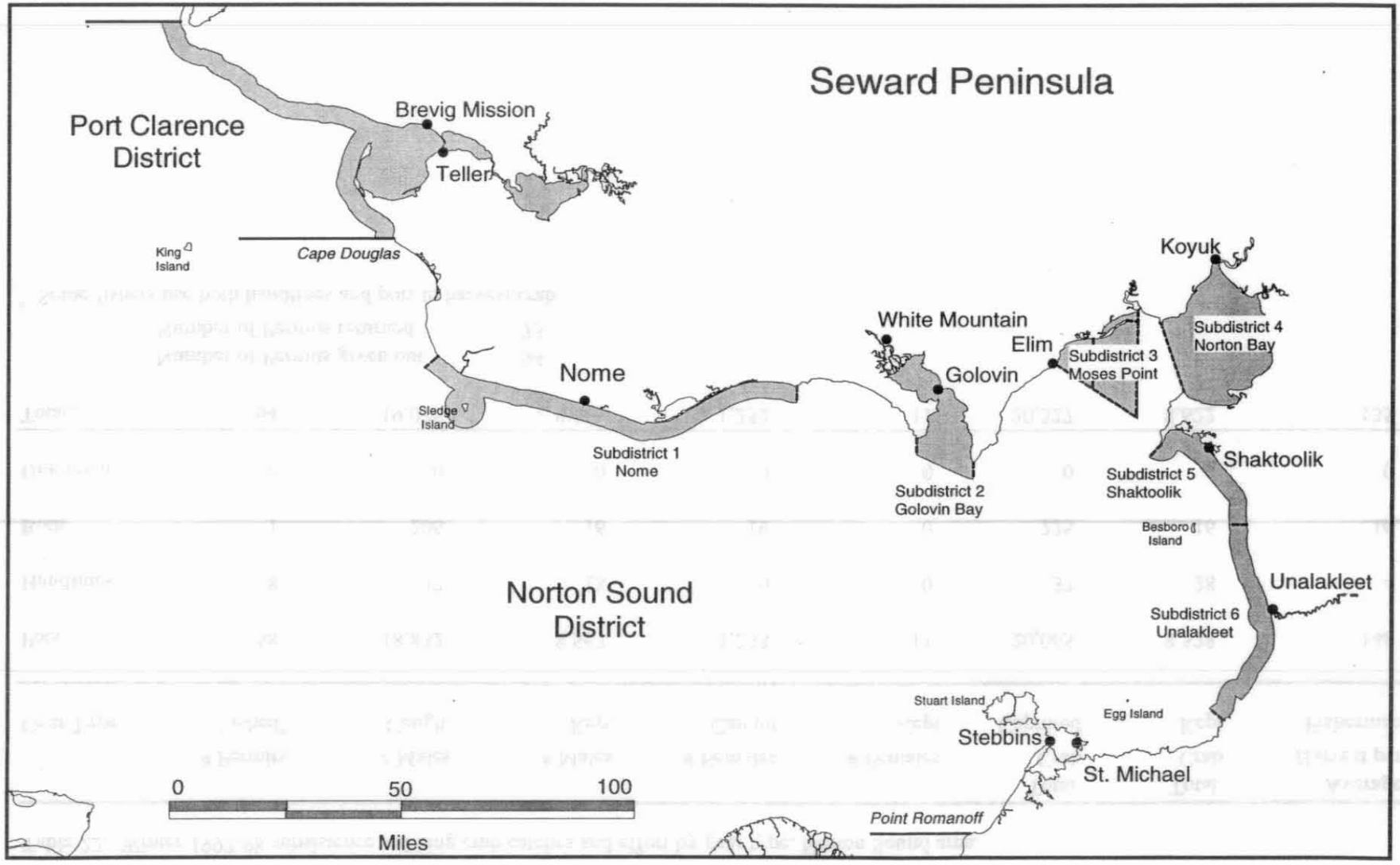
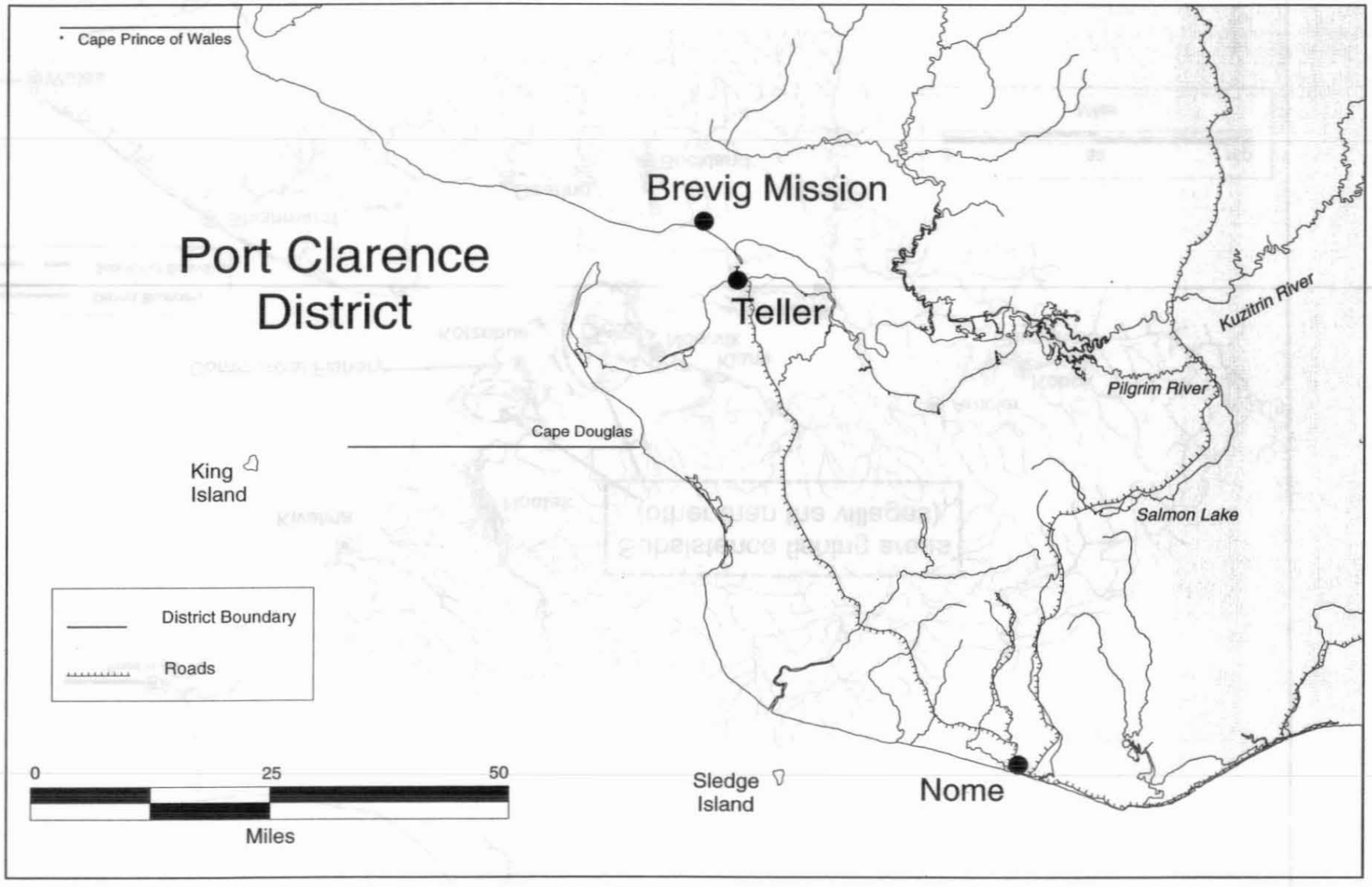


Figure 2. Port Clarence Salmon District



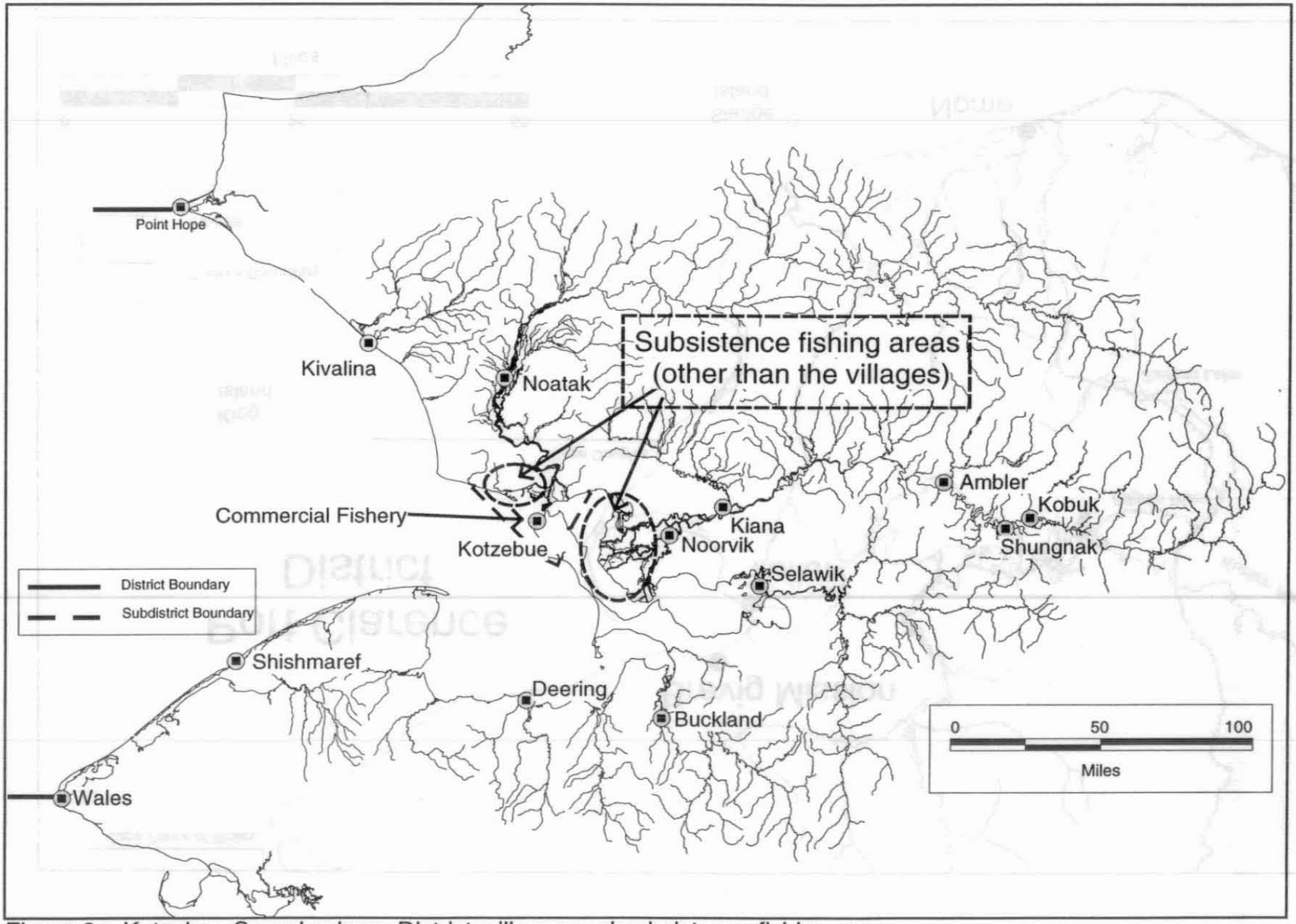
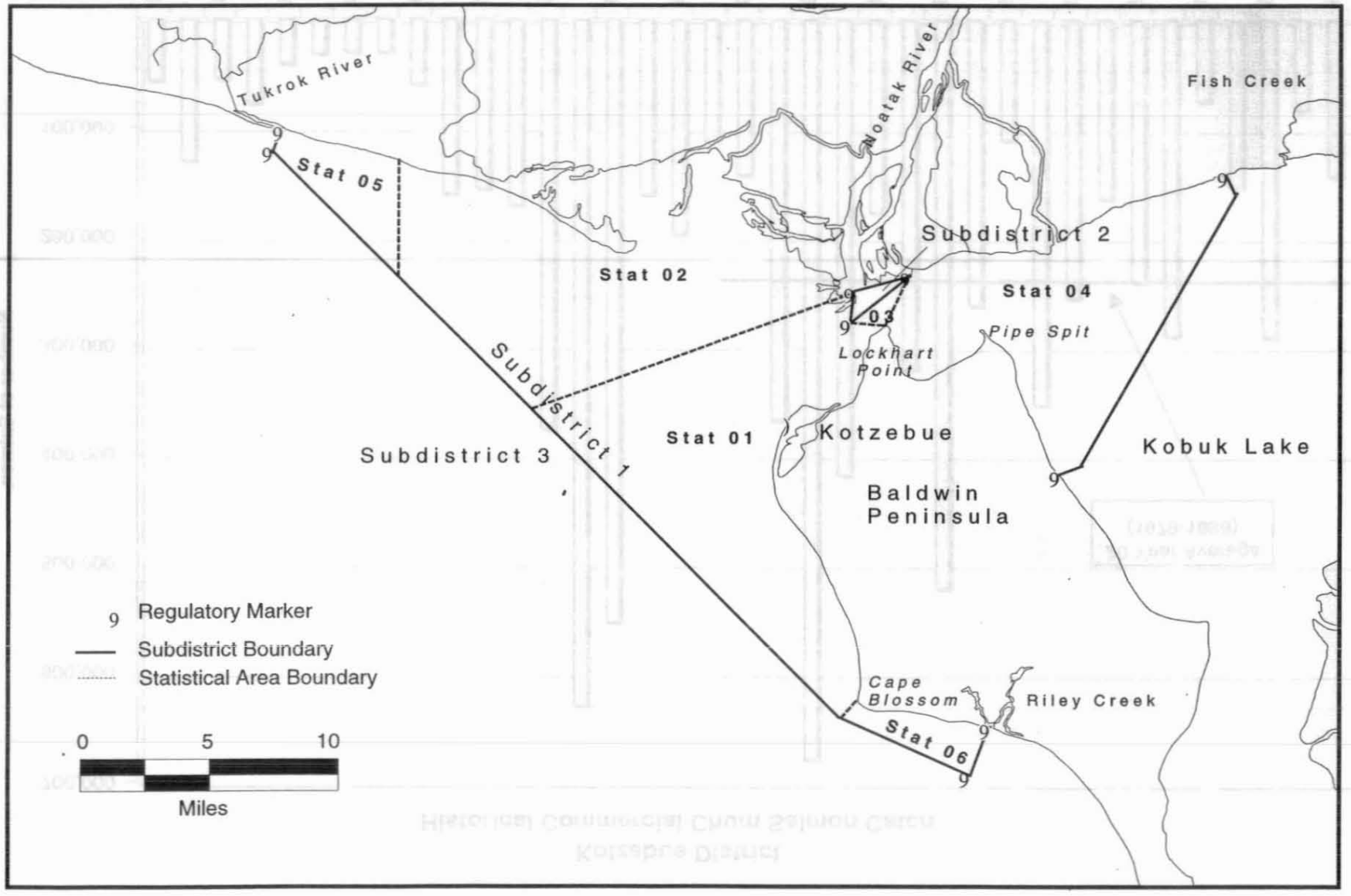


Figure 3. Kotzebue Sound salmon District, villages and subsistence fishing areas.

Figure 4. Kotzebue Sound Salmon fishing subdistricts and statistical areas.



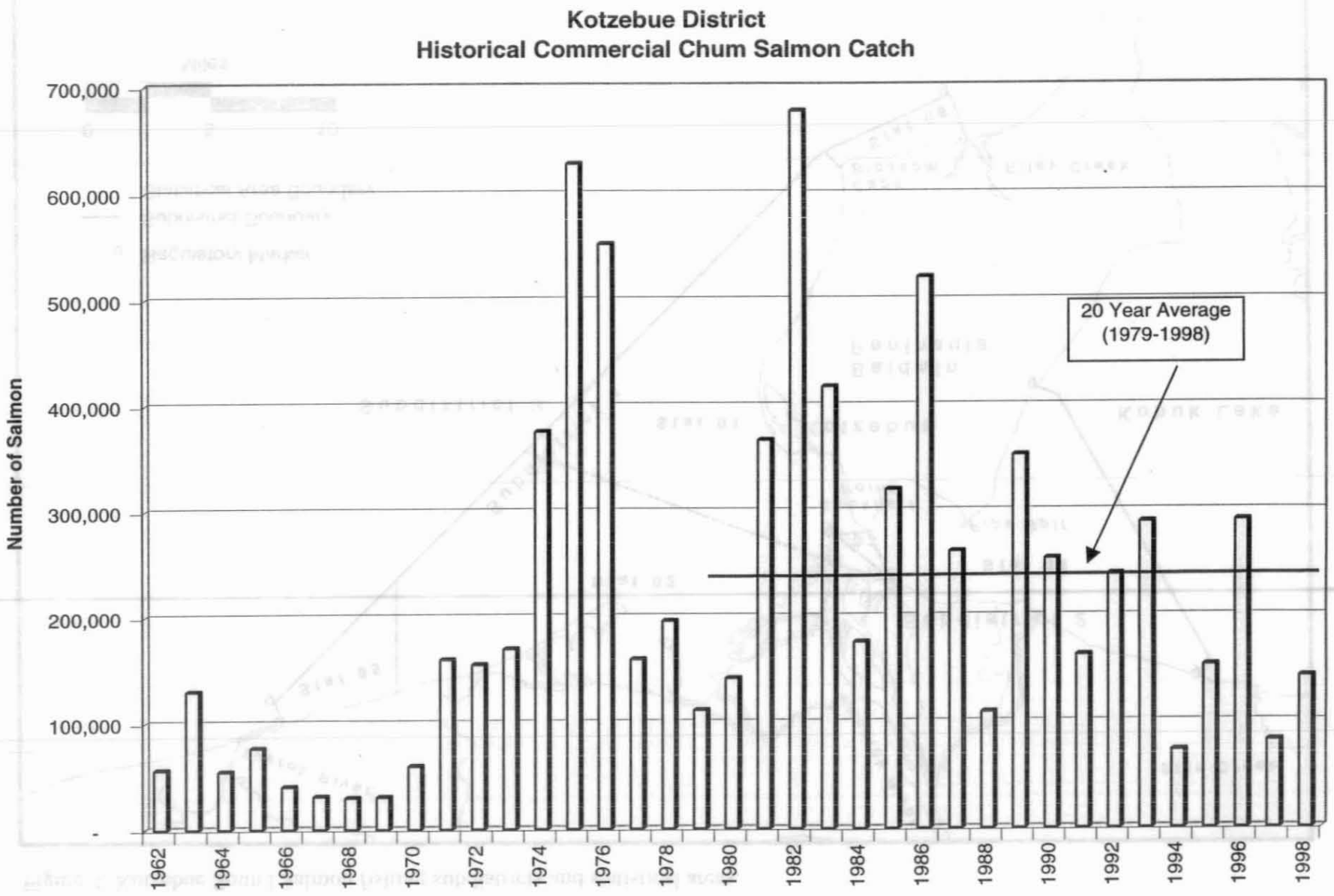
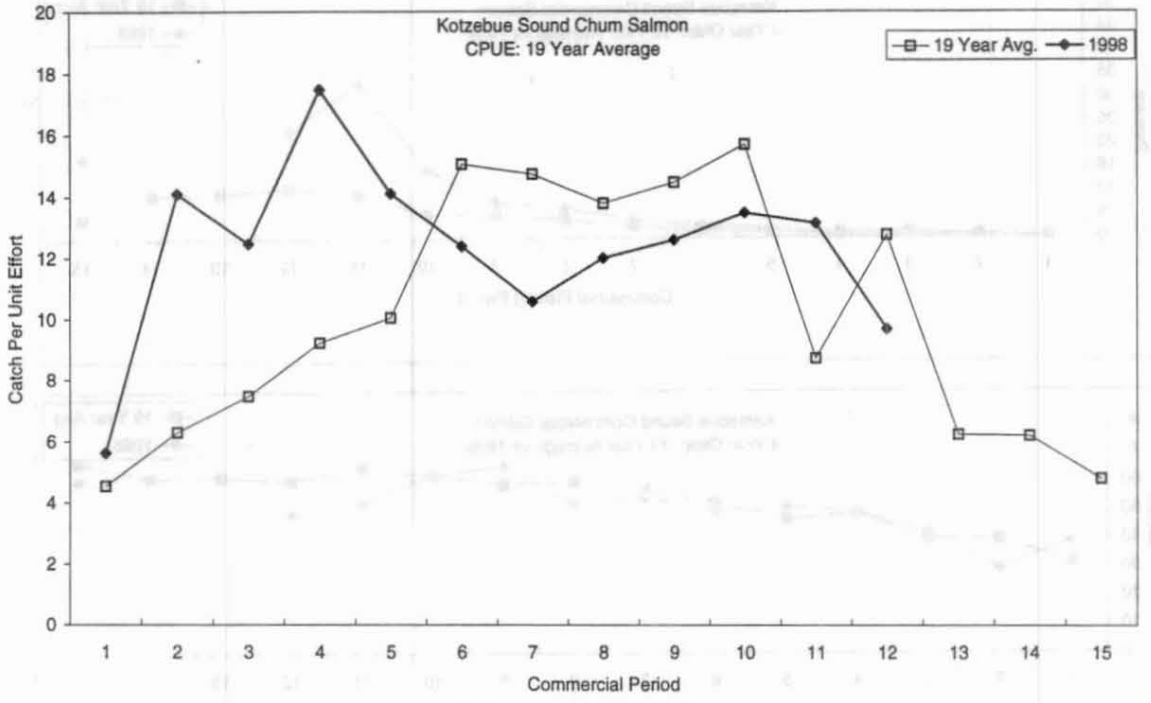


Figure 5. Kotzebue District chum salmon commercial catch by year, 1962-1998, and the 20 year average



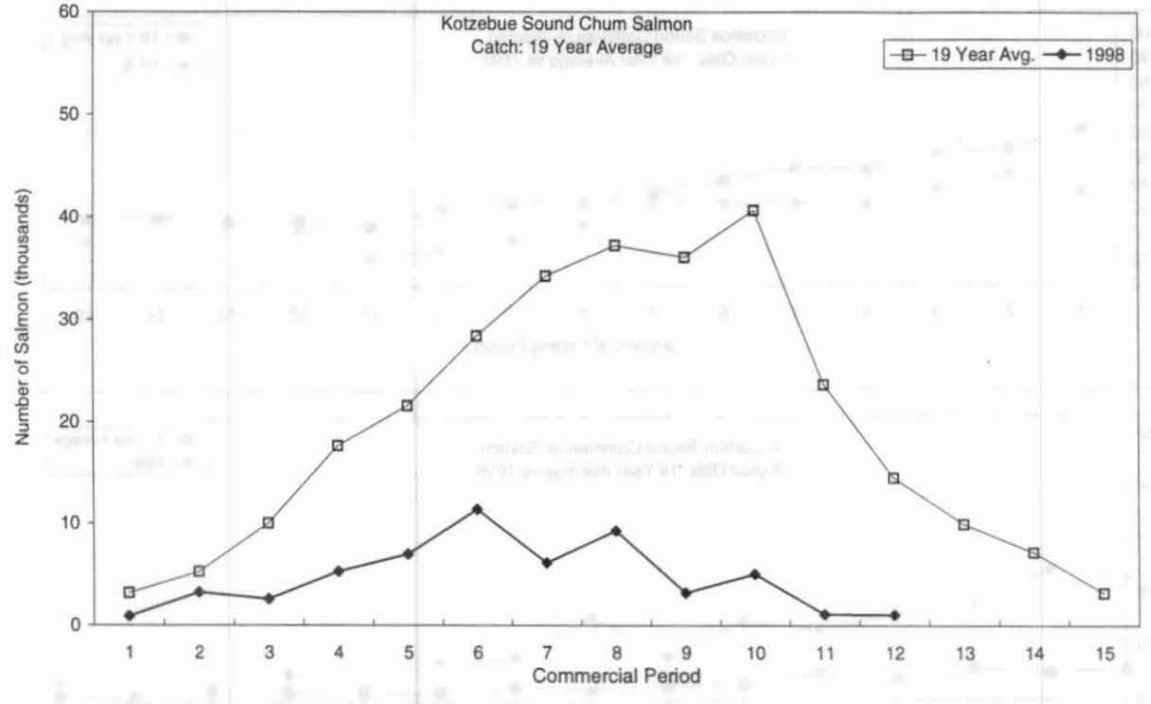
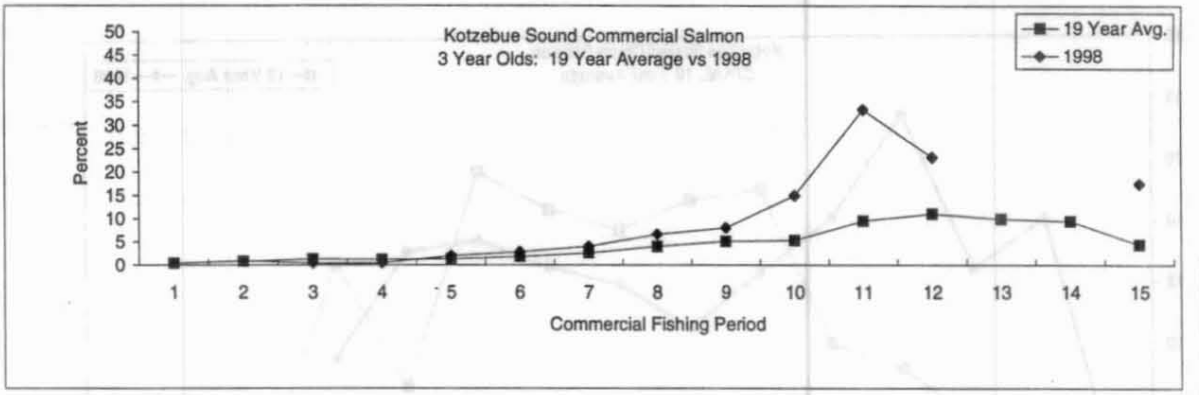
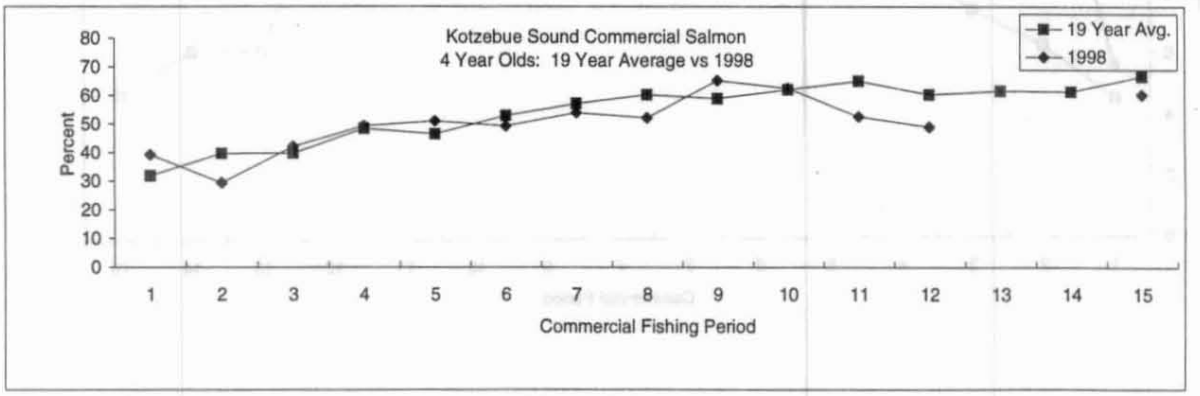
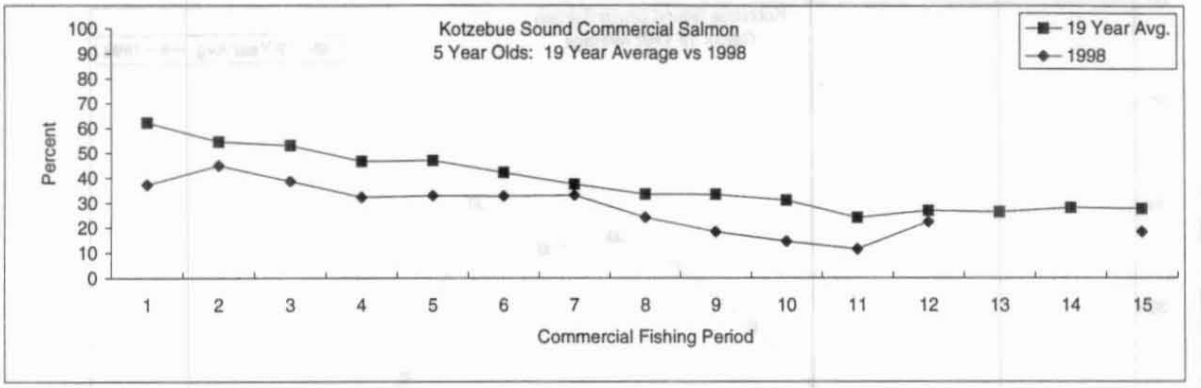


Figure 6. Kotzebue District chum salmon 19 year average (1979-1997) commercial catch and catch per unit effort as compared to 1998







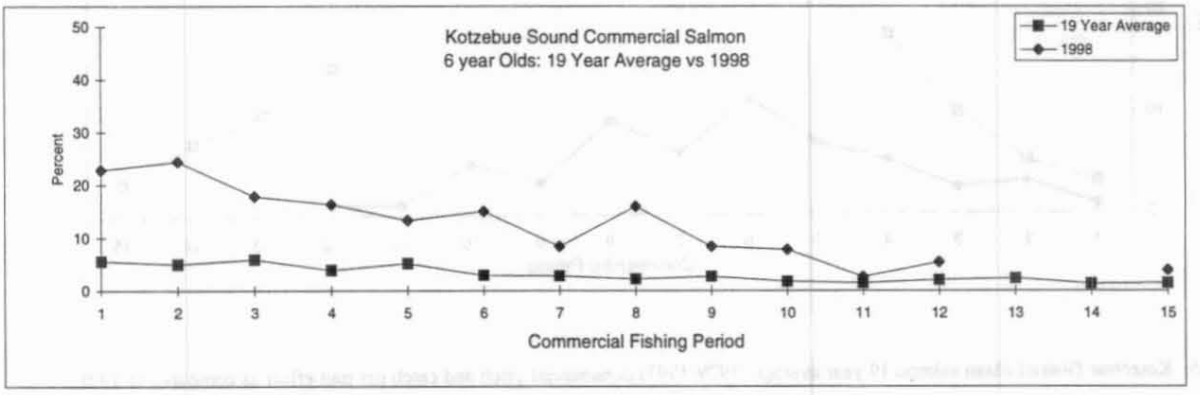


Figure 7. Kotzebue District commercial chum salmon 19 year average age composition by period, compared to 1998.

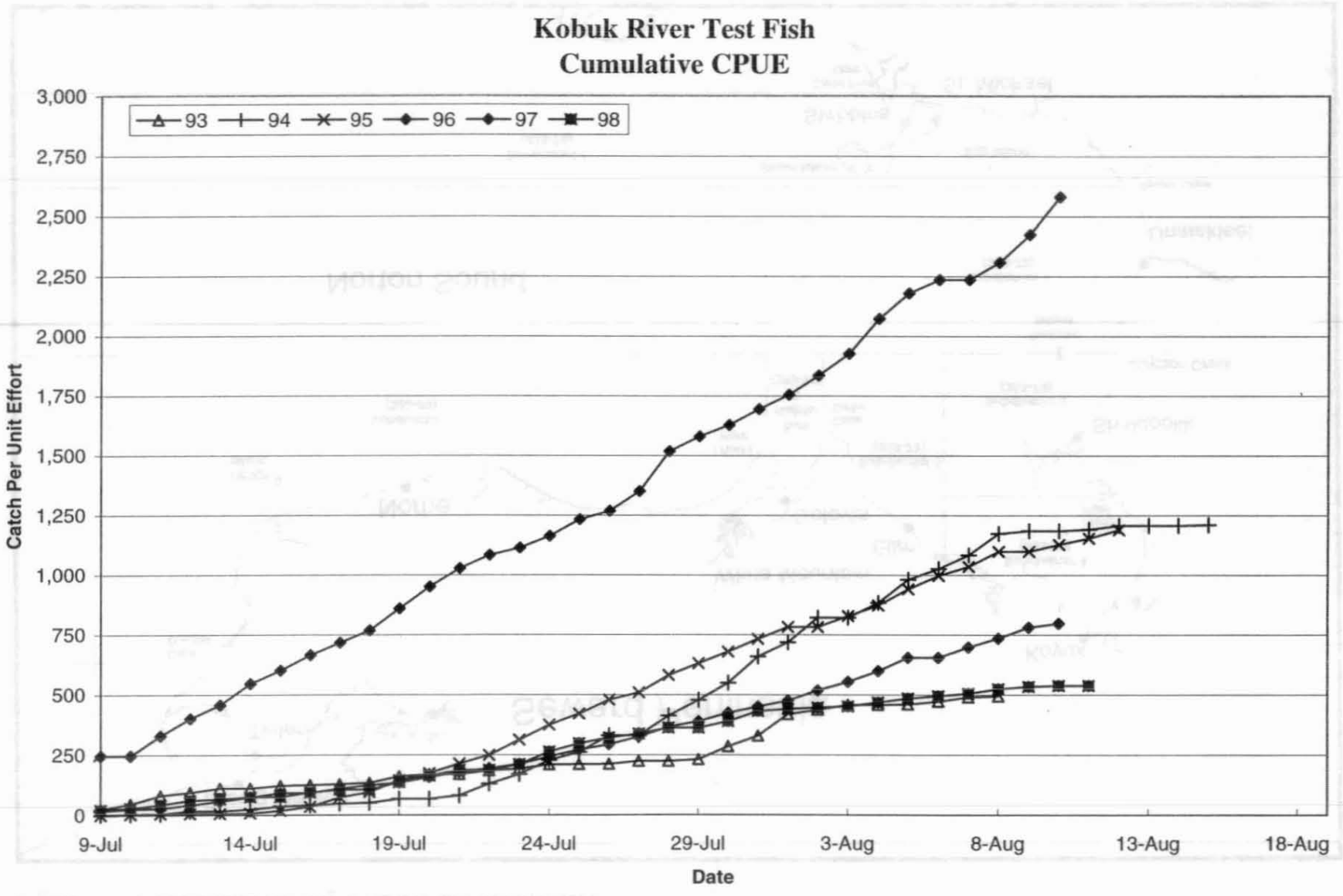


Figure 8. Kobuk River chum salmon drift test fish cumulative CPUE, 1993 - 1998.

Figure 9. Norton Sound Herring Districts and Subdistricts.

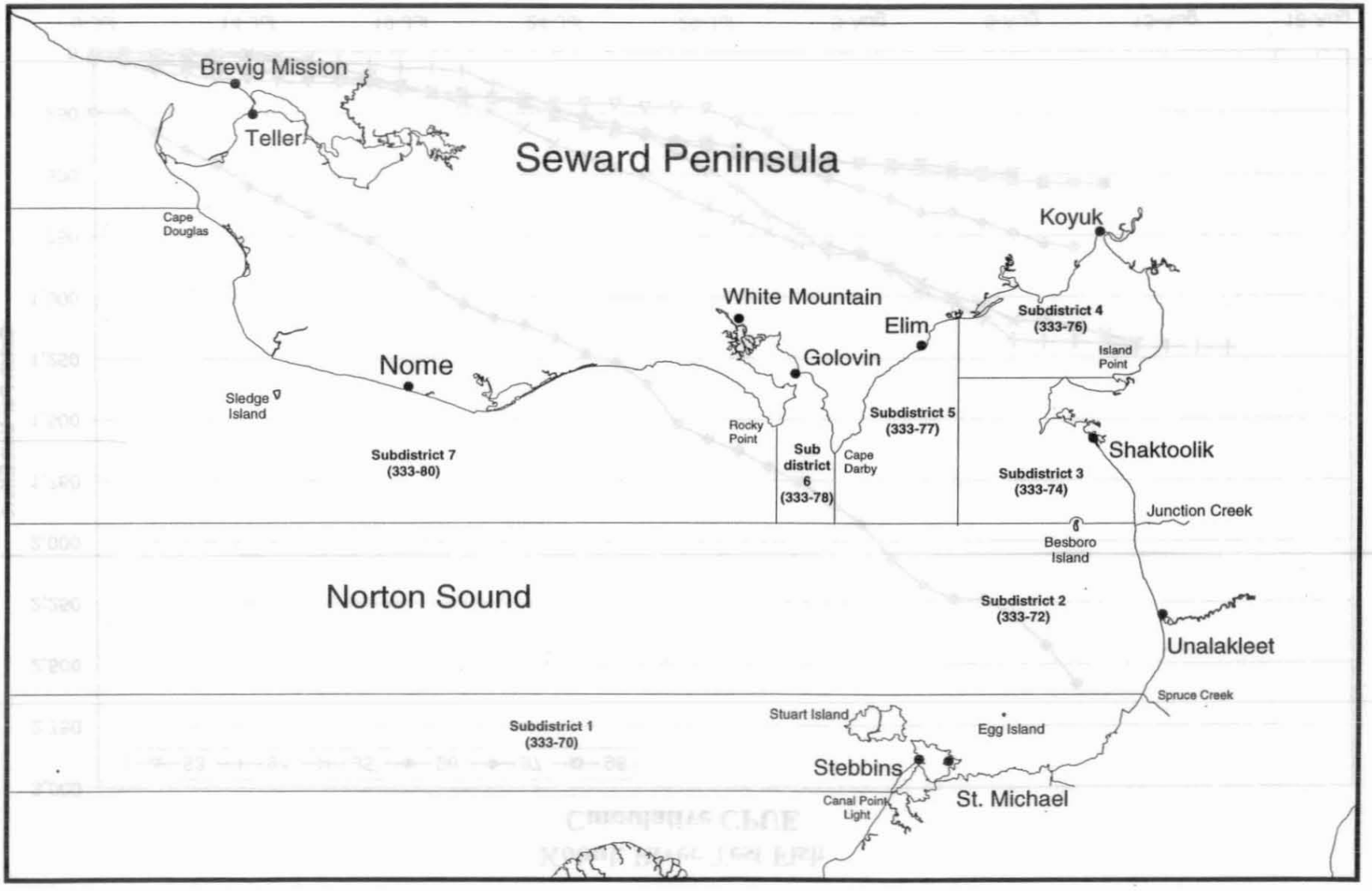
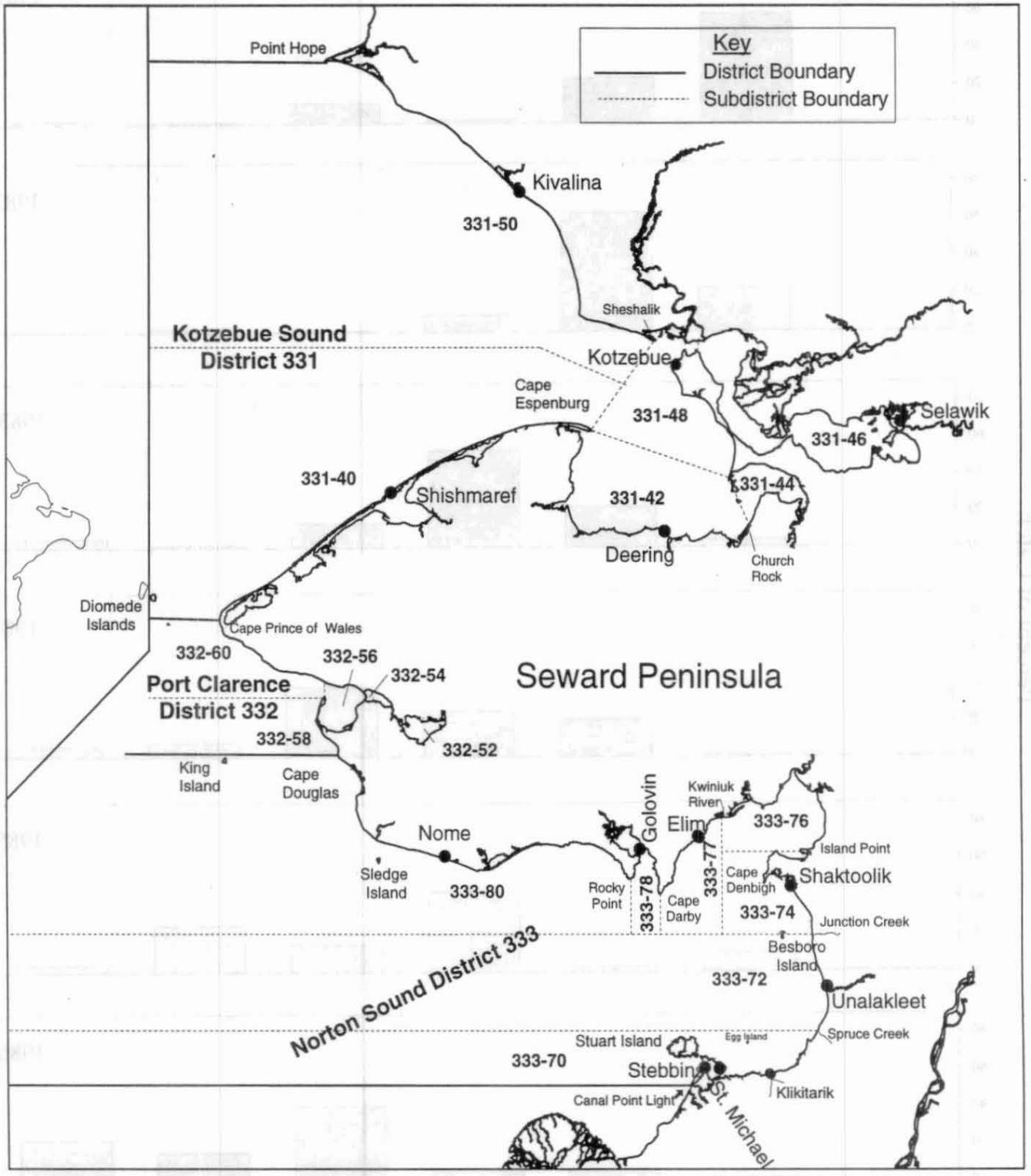


Figure 10 . Statistical areas of the Norton Sound, Port Clarence and Kotzebue Sound Herring Districts.



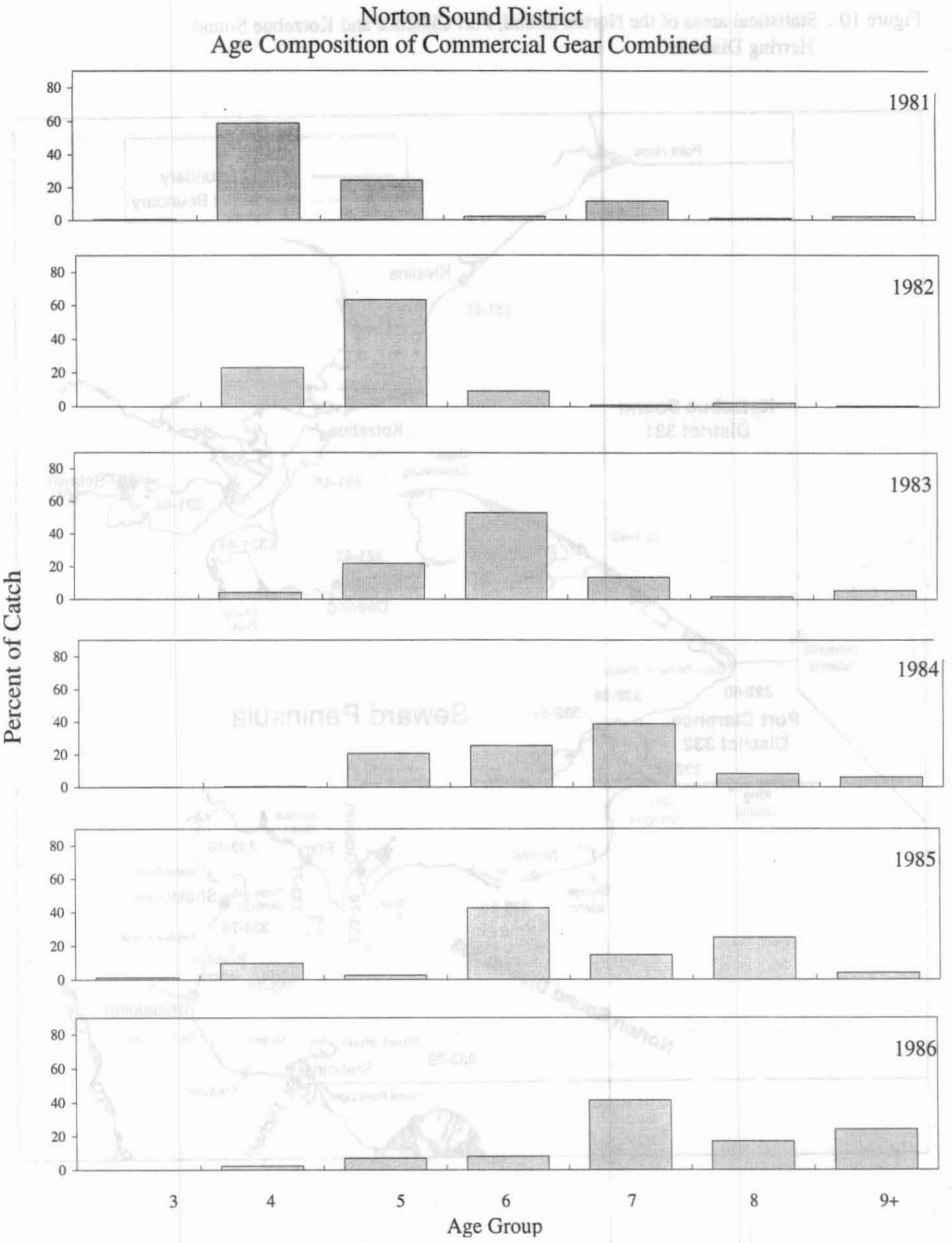


Figure 11. Norton Sound herring age class composition by percentage of commercial catch, commercial gear combined (beach seine and gill nets), 1981-1998.

Norton Sound District
Age Composition of Commercial Gear Combined

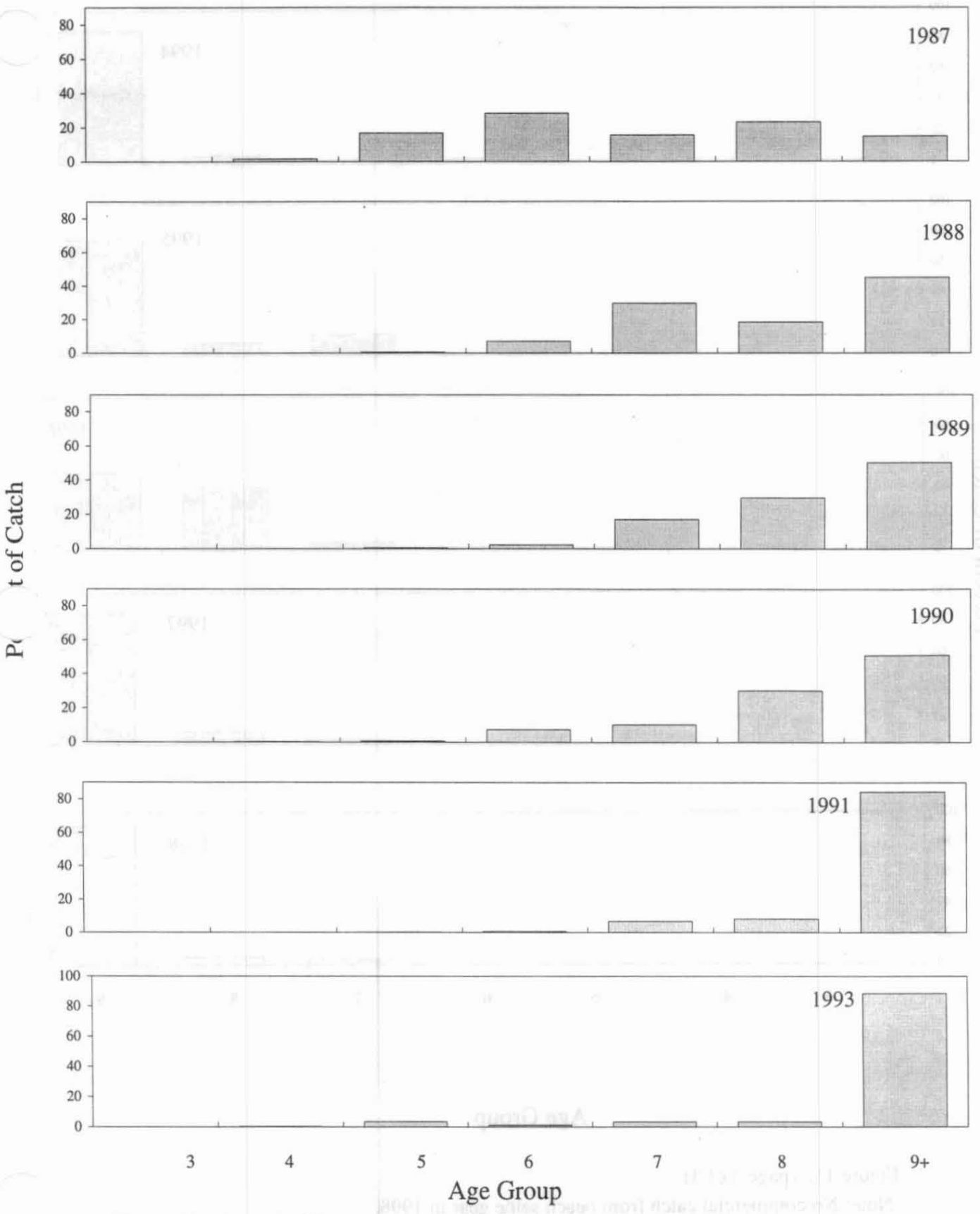


Figure 11. (page 2 of 3)
note: No commercial fishing occurred in 1992.

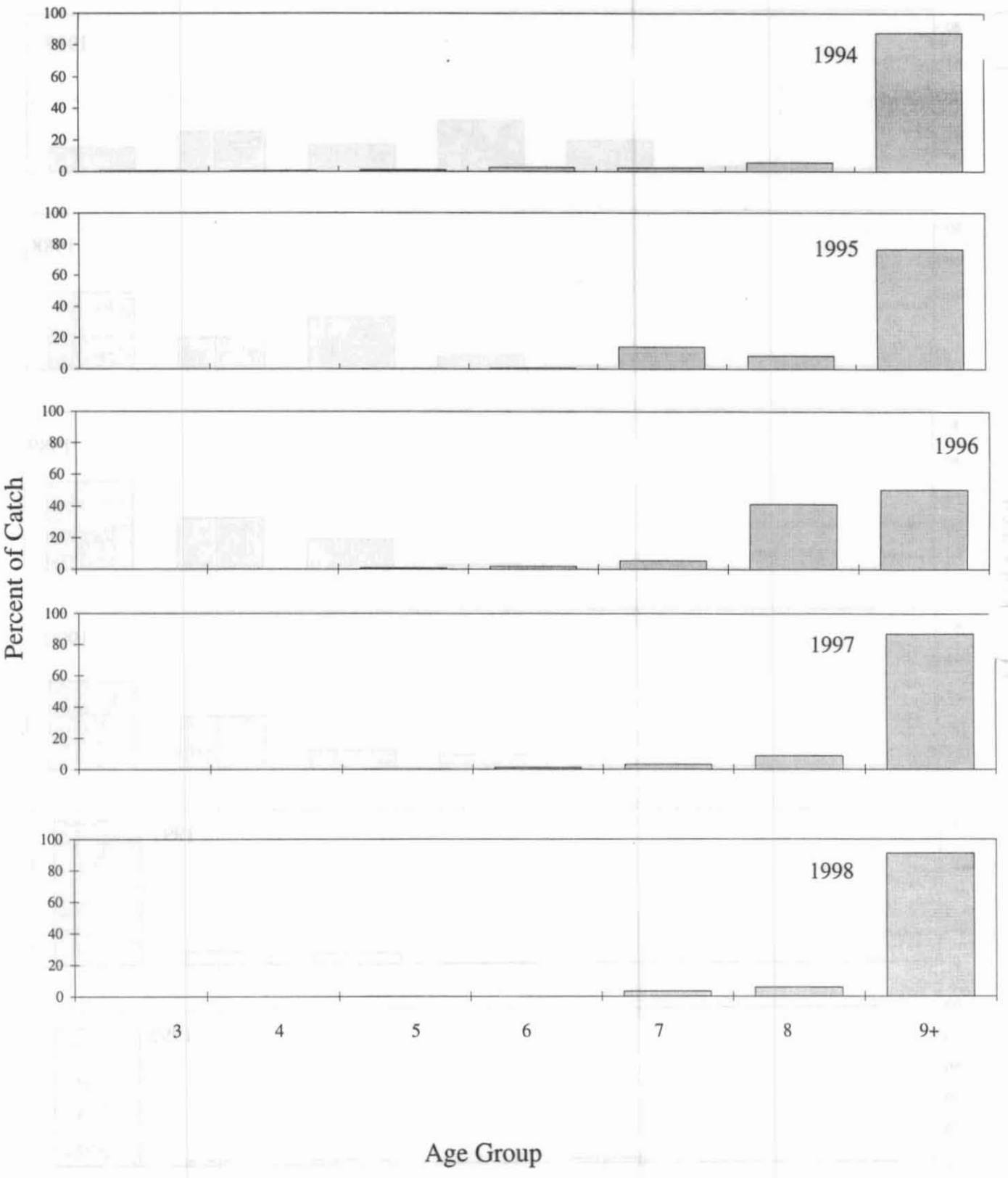


Figure 11. (page 3 of 3)
Note: No commercial catch from beach seine gear in 1998.

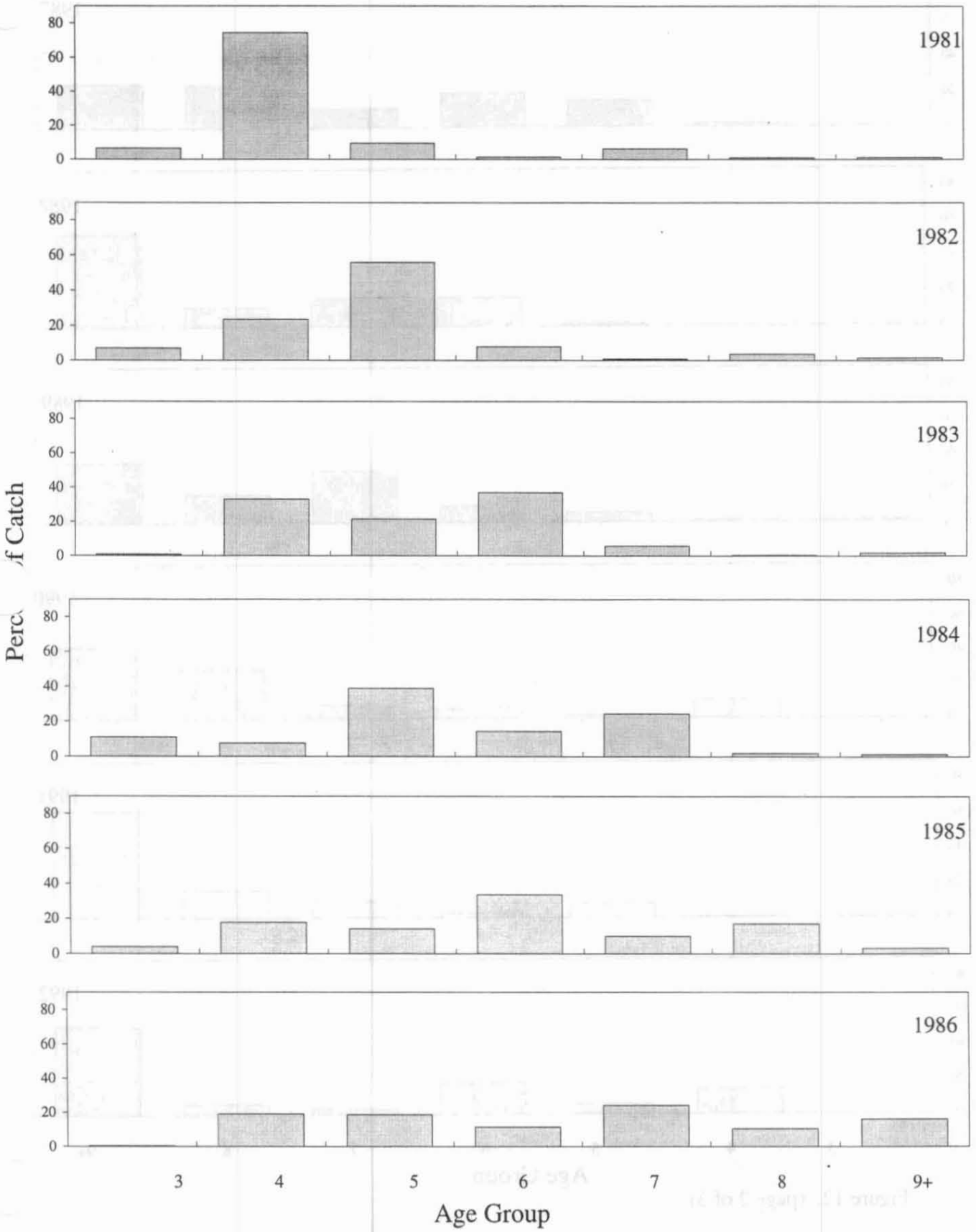


Figure 12. Norton Sound herring age class composition by percentage of total catch , variable mesh gill nets, 1981-1998.

Norton Sound District
Age Composition of Variable Mesh Gill Nets

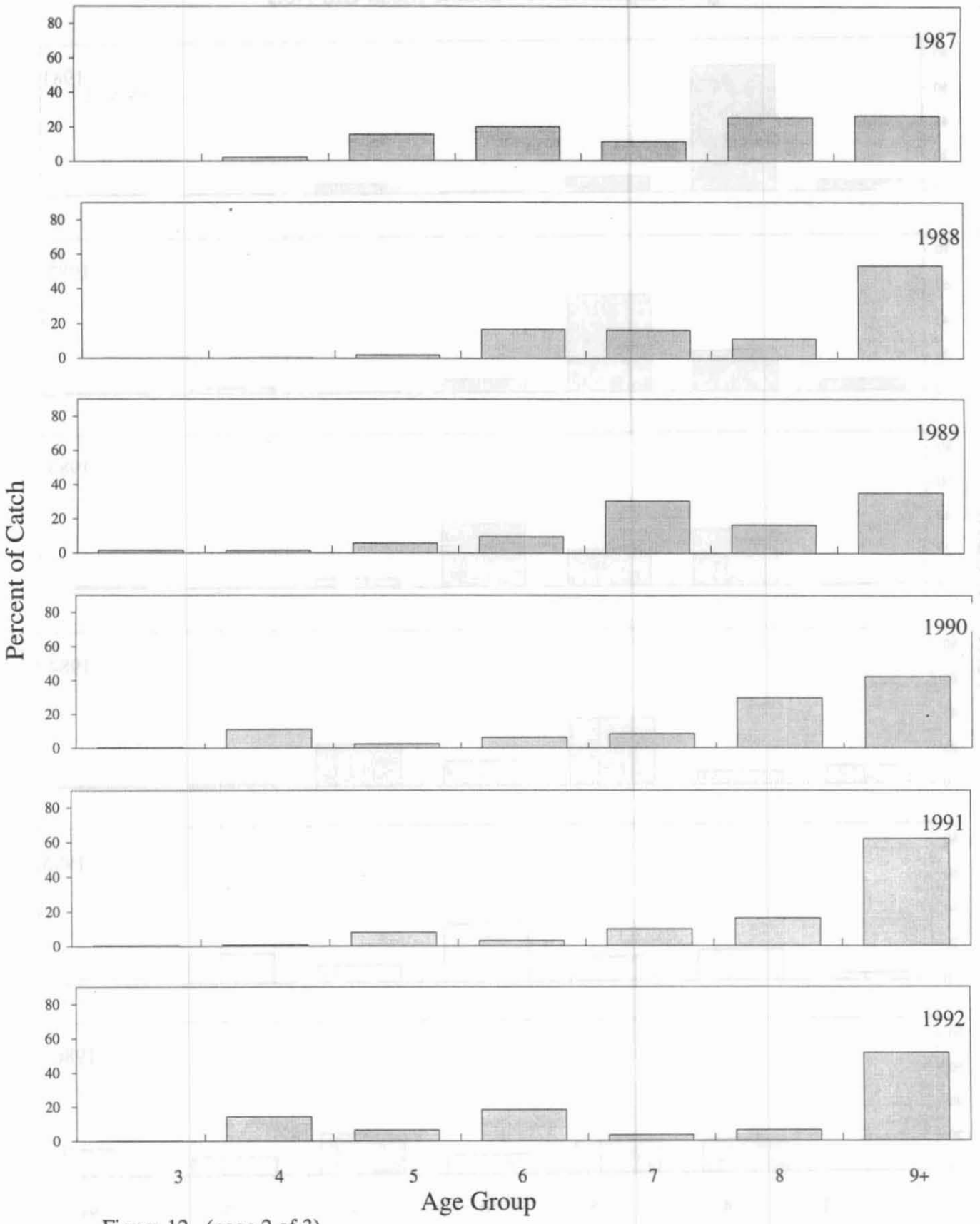


Figure 12. (page 2 of 3)

Norton Sound District
Age Composition of Variable Mesh Gill Nets

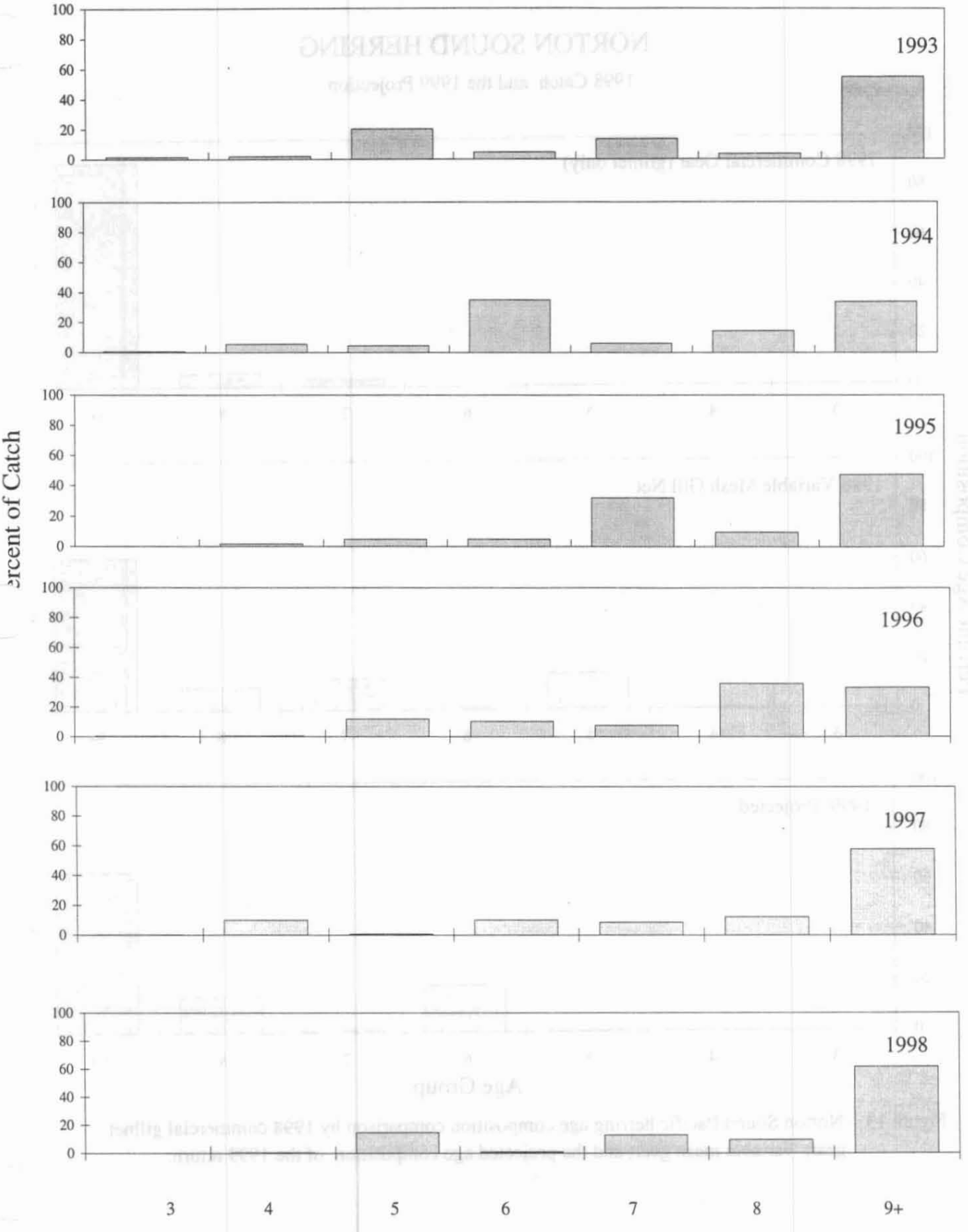


Figure 12. (page 3 of 3)

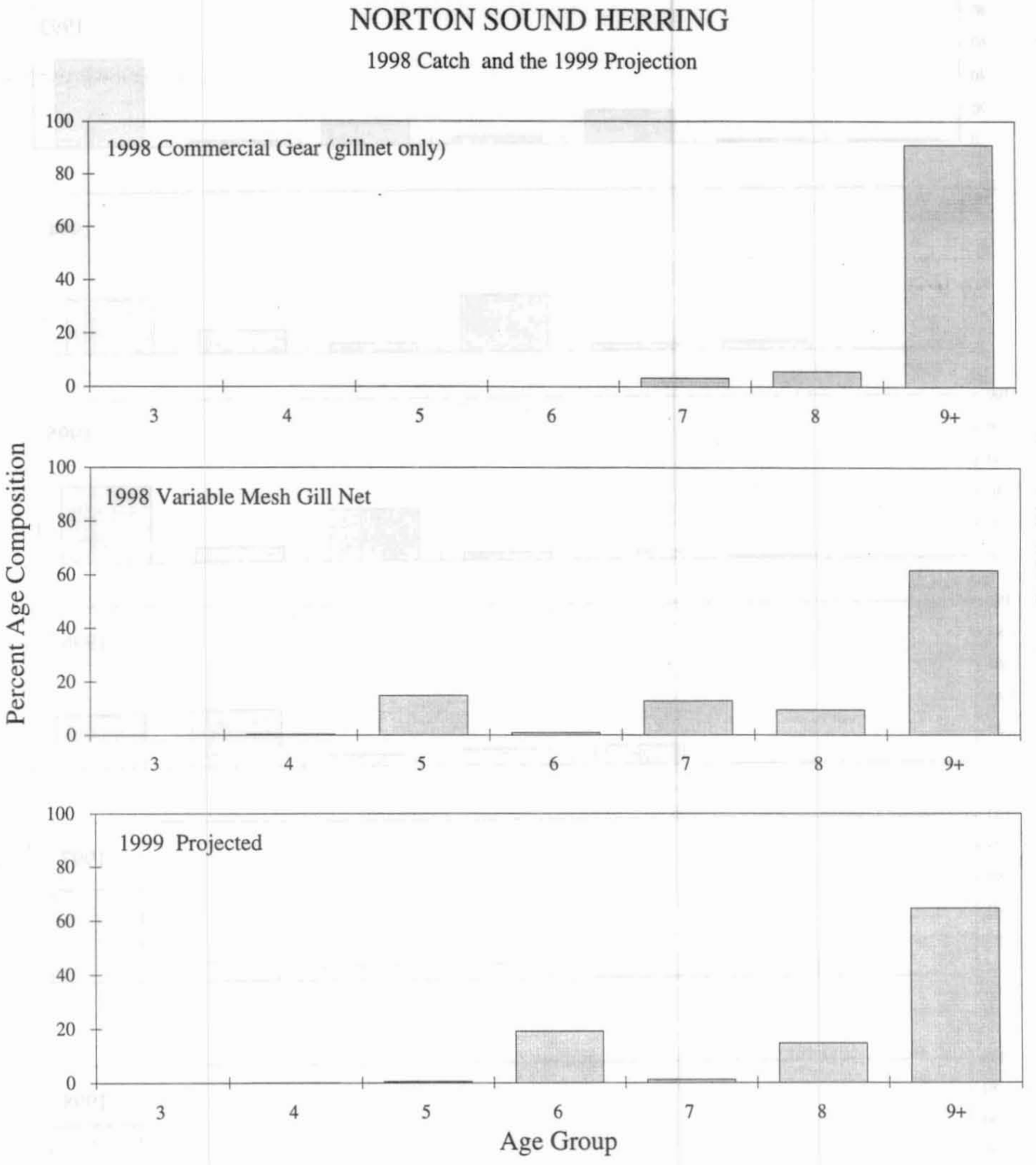


Figure 13. Norton Sound Pacific herring age composition comparison by 1998 commercial gillnet gear, variable mesh gear, and the projected age composition of the 1999 return.

Figure 14. Statistical Areas for the Norton Sound red king crab fishery.

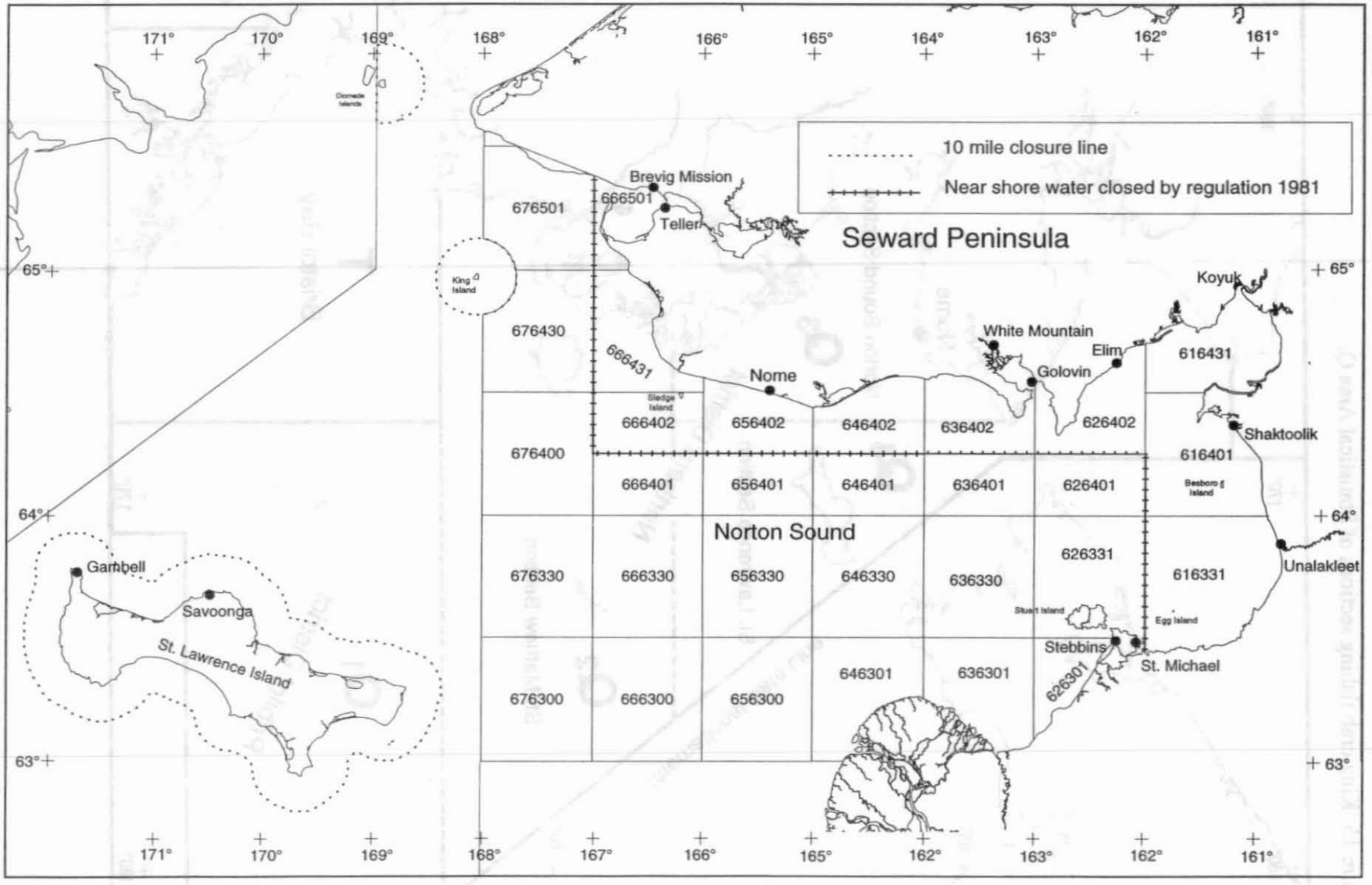
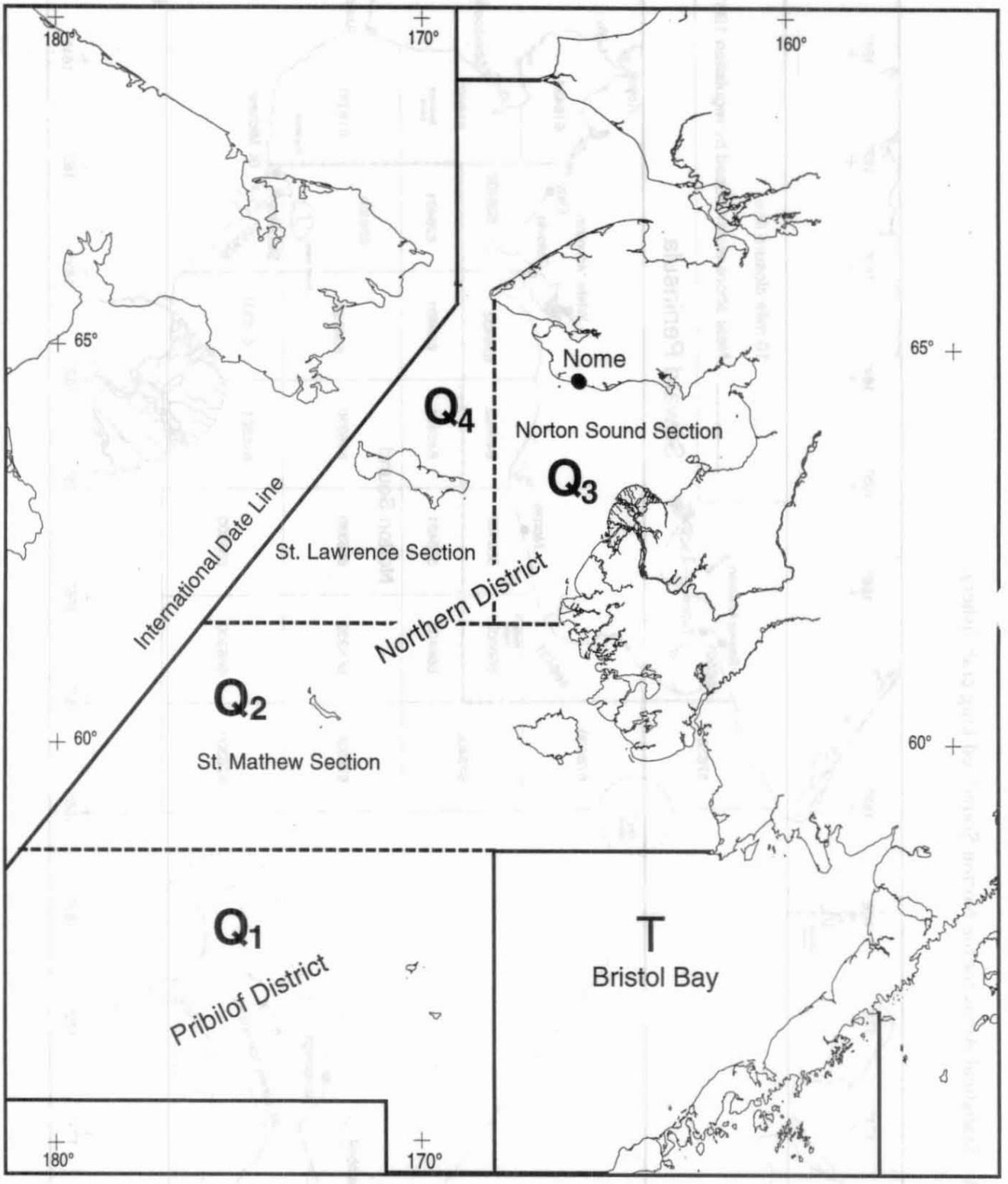


Figure 15. King crab fishing sections of Statistical Area Q.



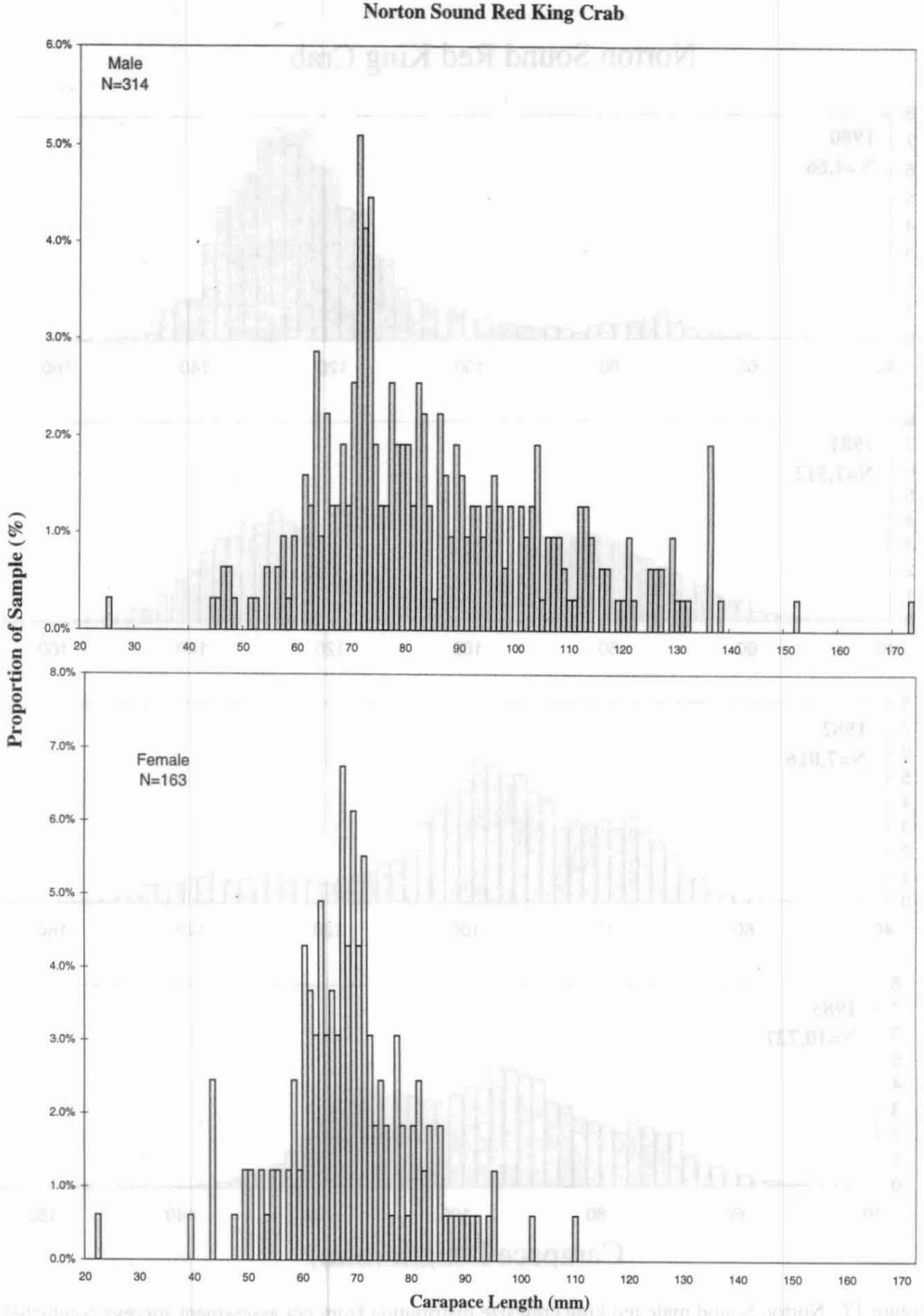


Figure 16. Norton Sound male and female red king crab size distribution from a trawl assessment survey conducted by ADF&G, 1996.

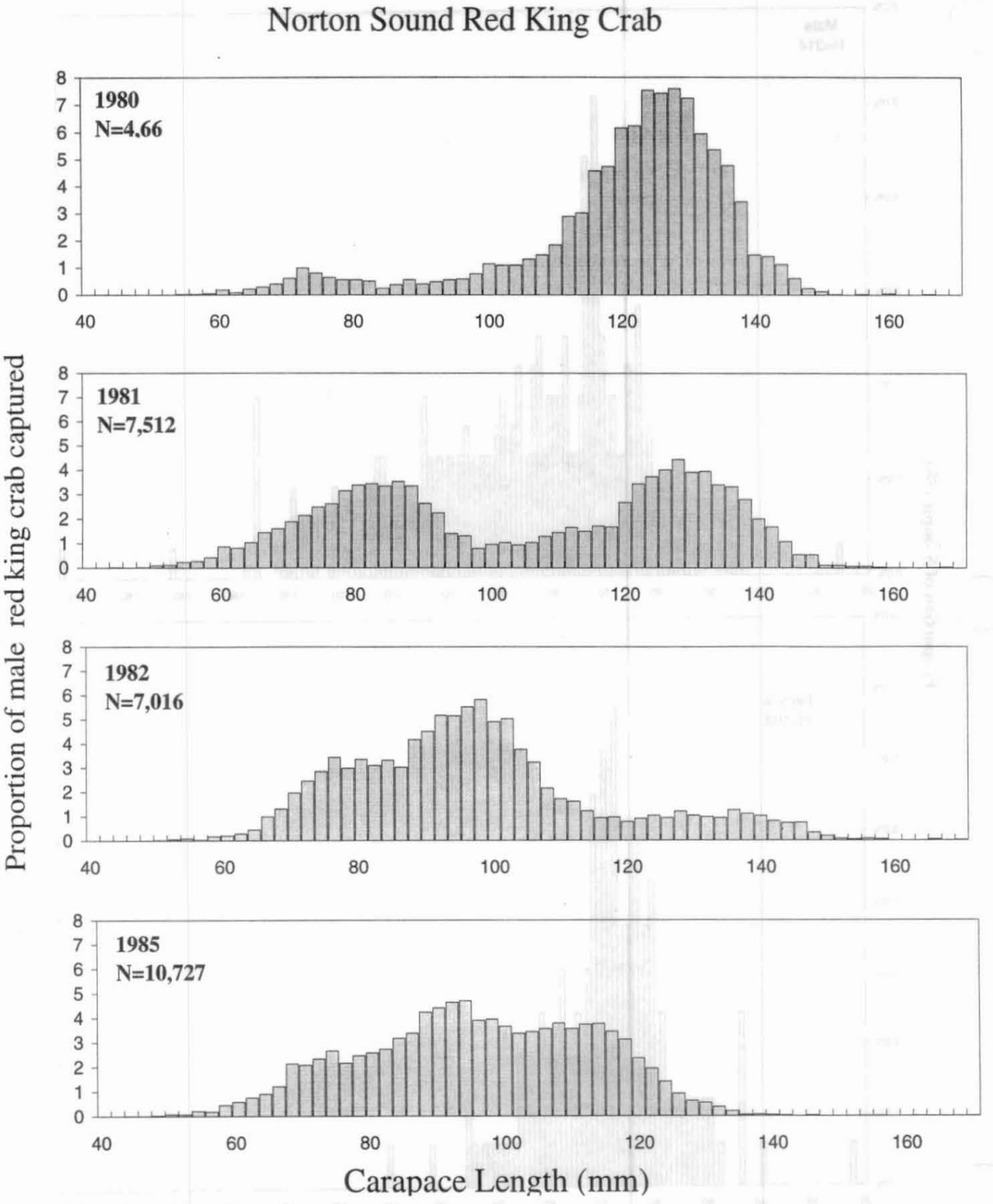


Figure 17. Norton Sound male red king crab size distribution from pot assessment surveys conducted by the Alaska Department of Fish and Game, 1980, 1981, 1982, and 1985.

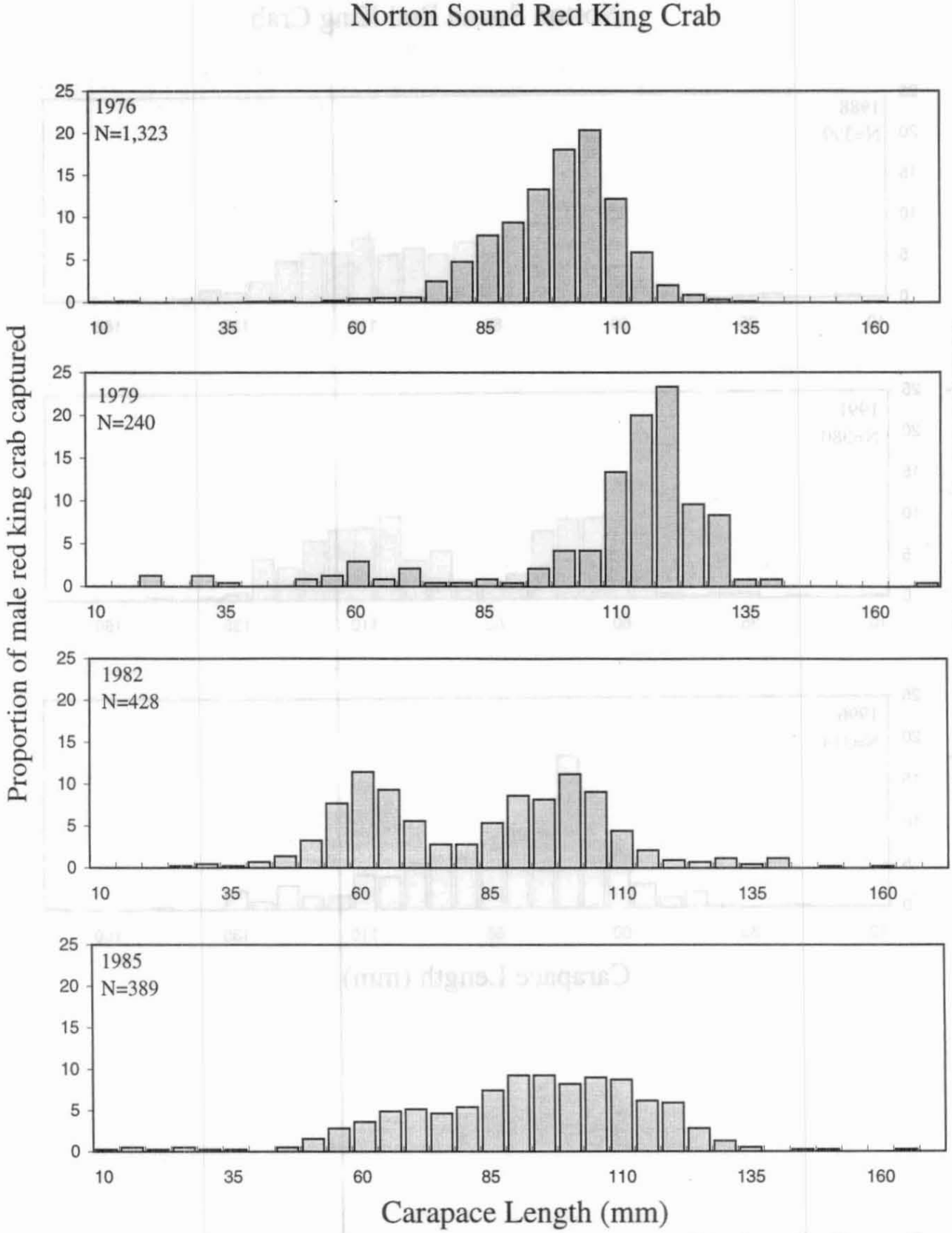


Figure 18. Norton Sound male red king crab size distribution from trawl assessment surveys conducted by the National Marine Fisheries Service, 1976, 1979, 1982, 1985, 1988, 1991, and by ADF&G in 1996 (Page 1 of 2).

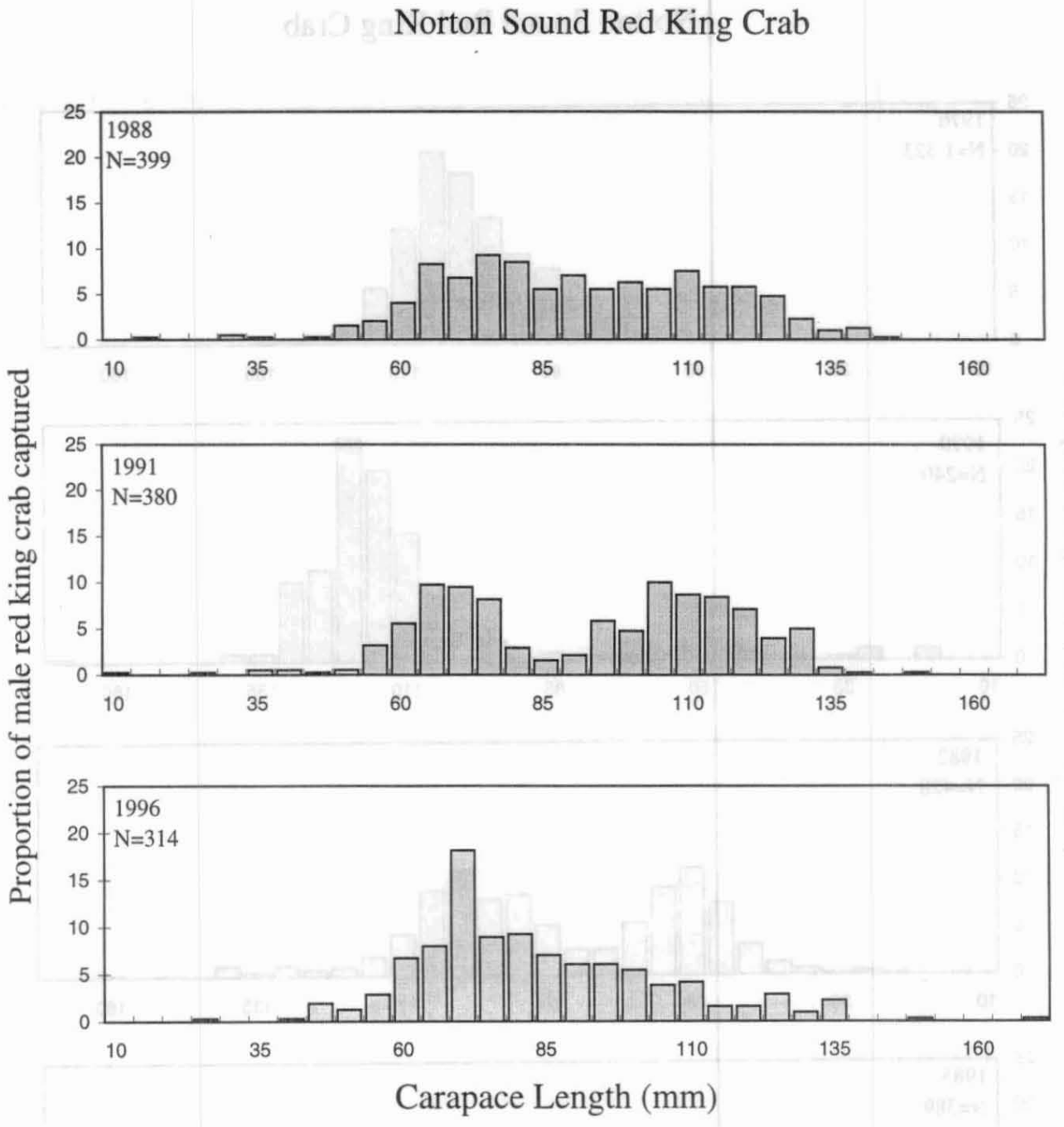


Figure 18. (Page 2 of 2)

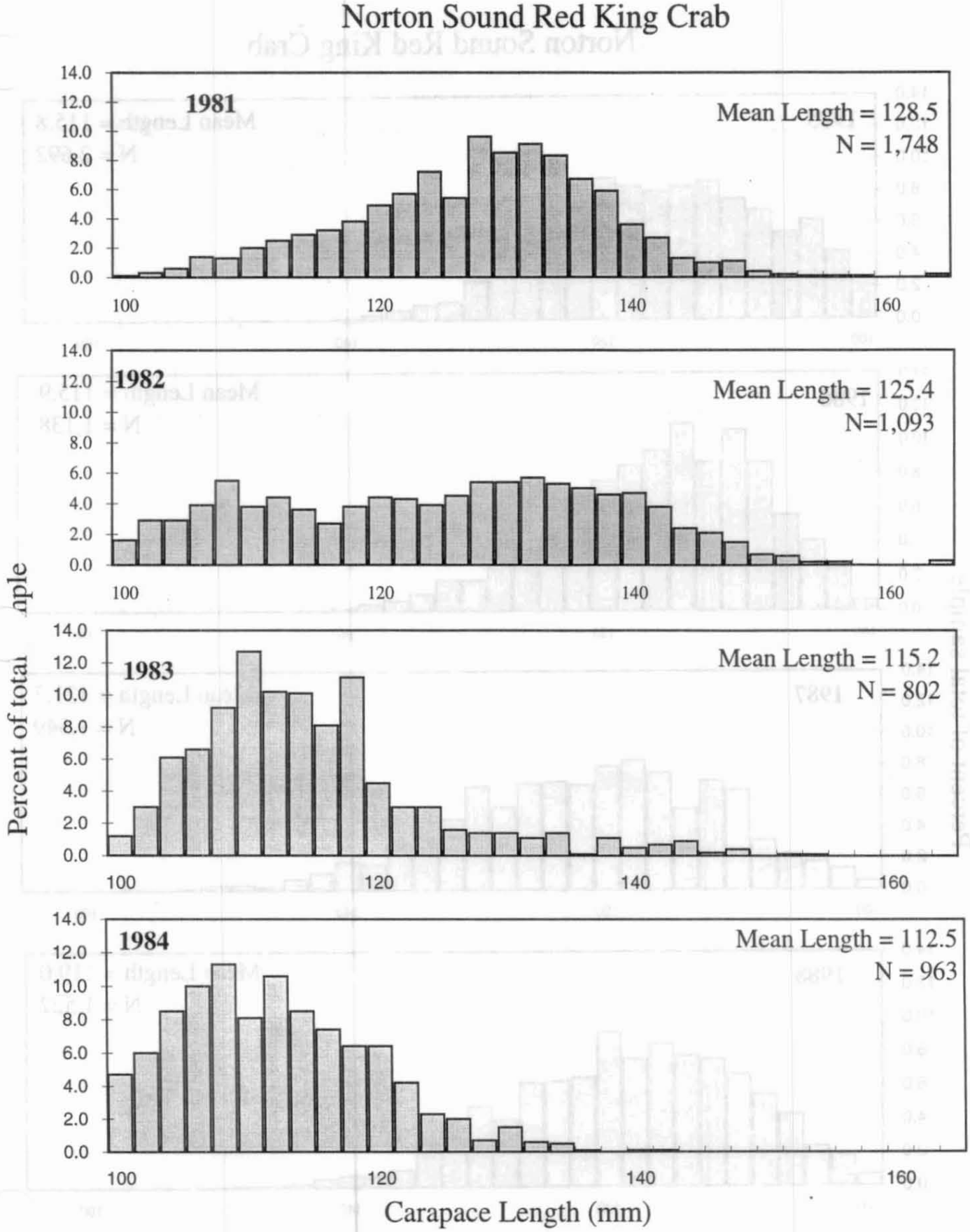


Figure 19. Length composition of Norton Sound red king crab summer commercial harvest, 1981-1998.

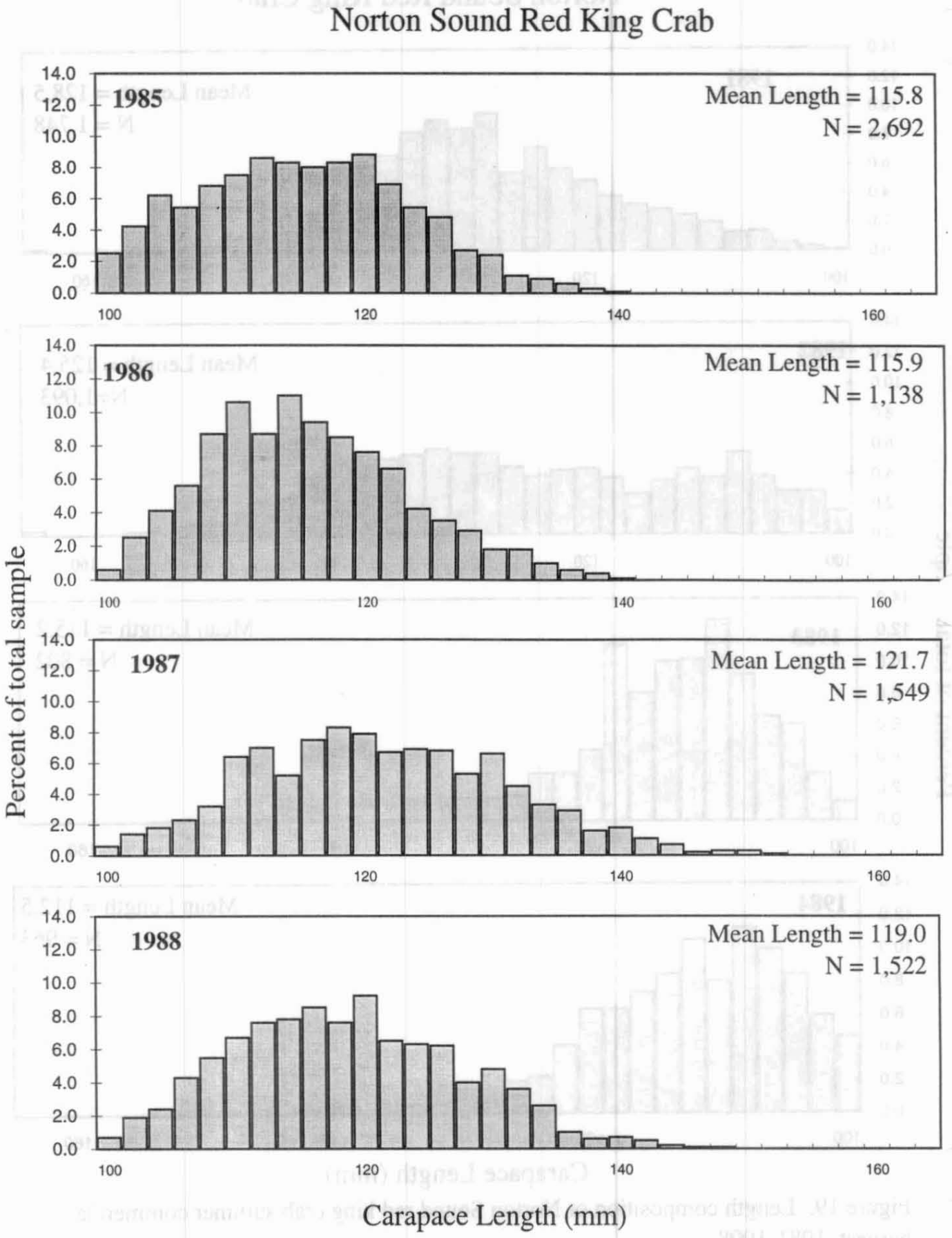


Figure 19. (page 2 of 5)

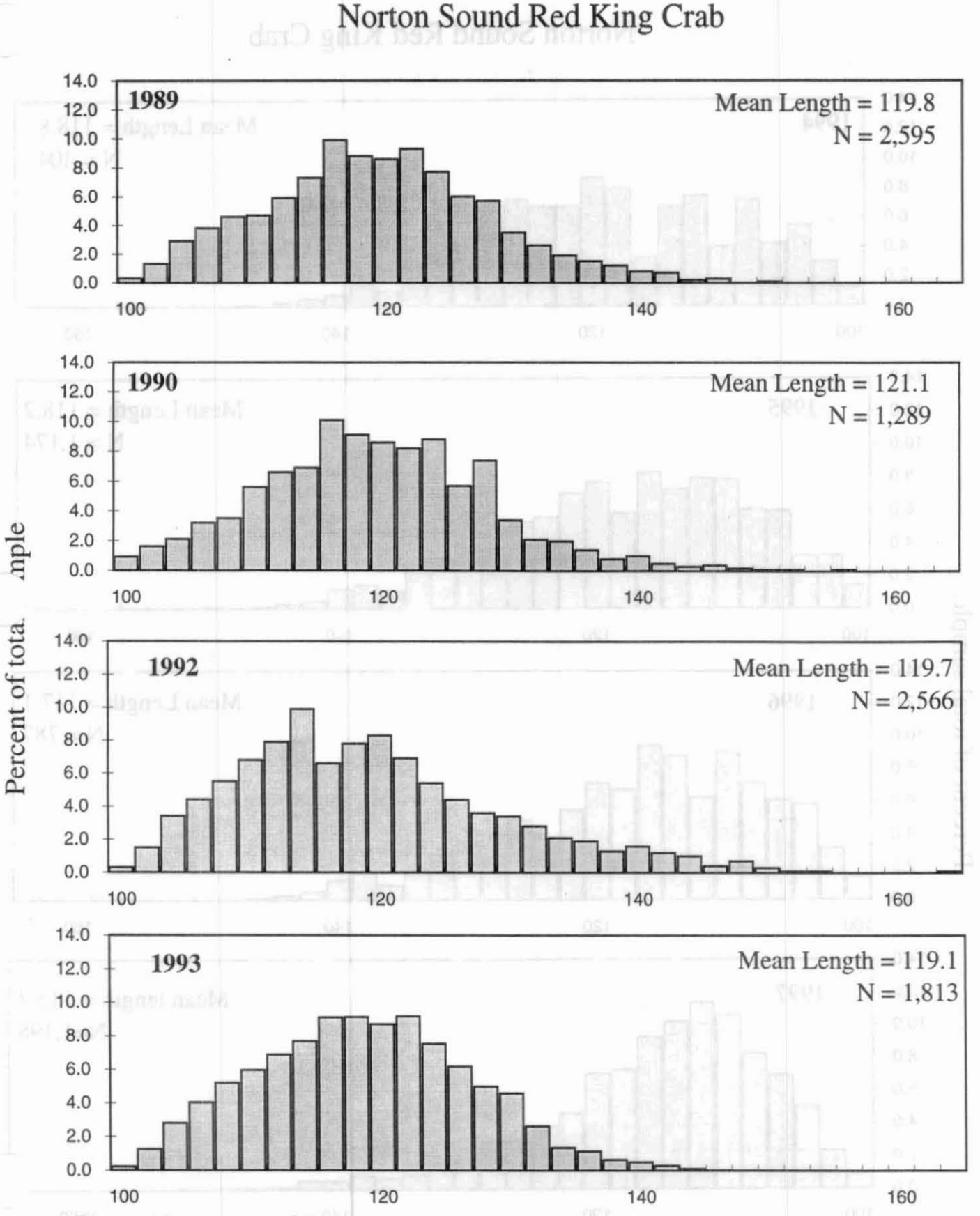


Figure 19. (page 3 of 5)
Note:There was no fishery in 1991.

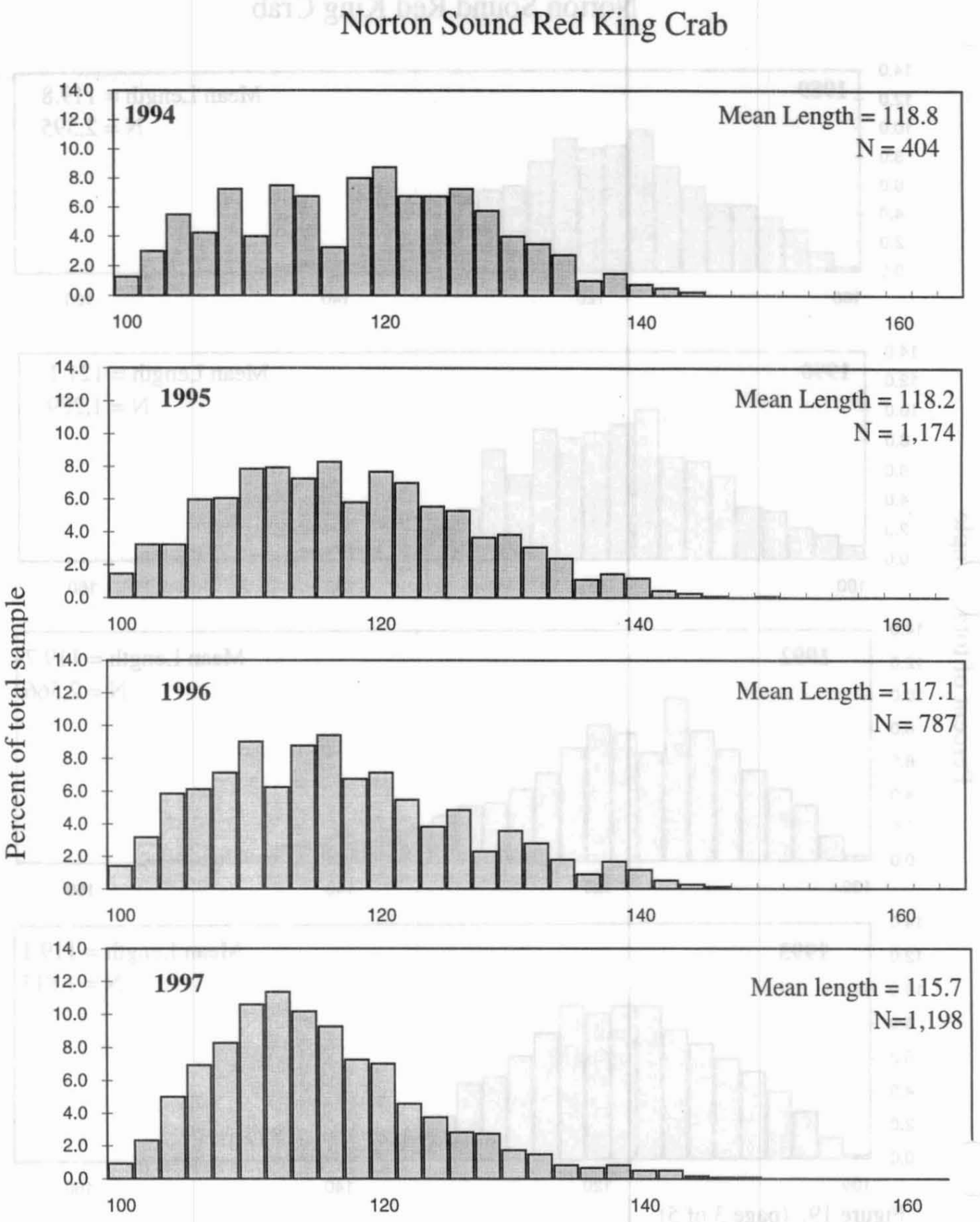
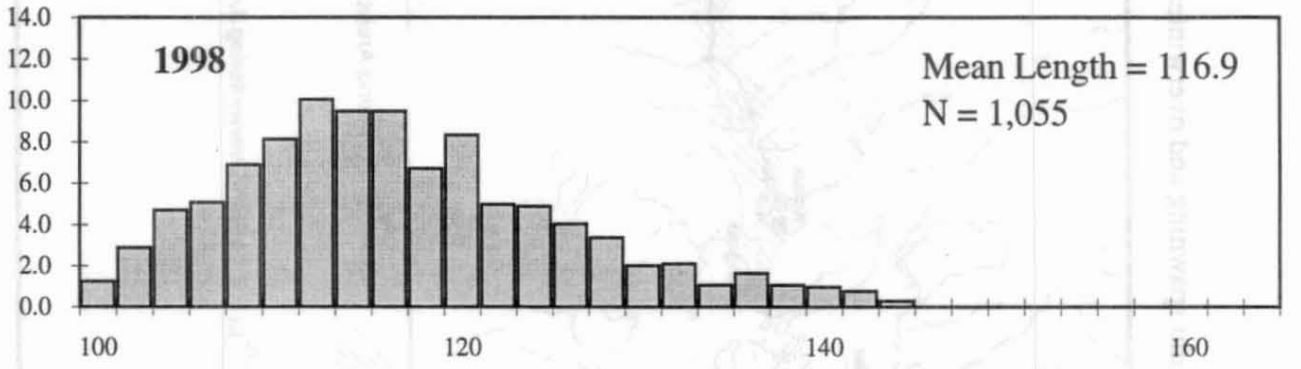


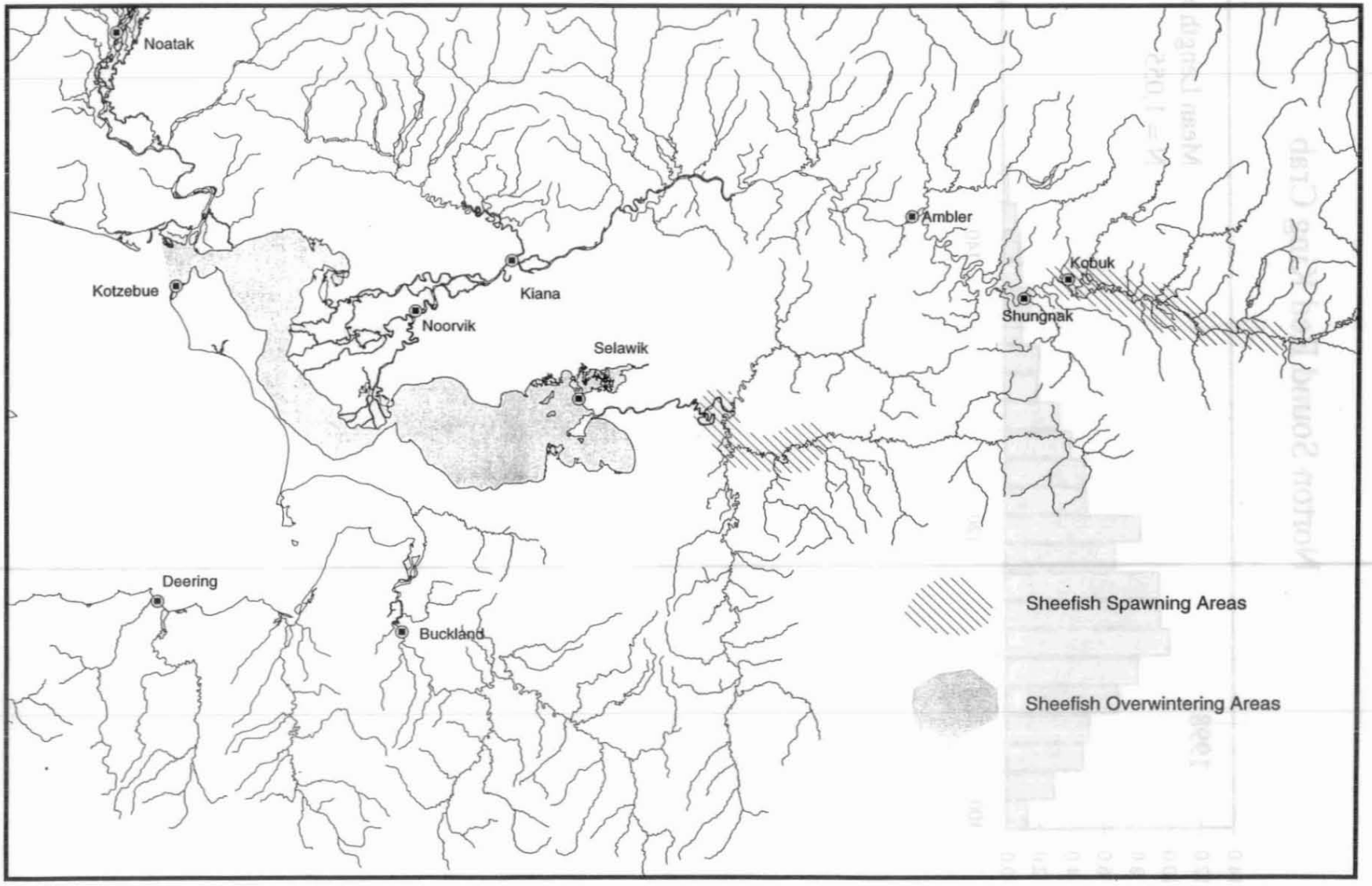
Figure 19. (page 4 of 5)



Perc of total sample

Figure 19. (page 5 of 5)

Figure 20. Kotzebue and Kobuk River Valley villages and their spatial relationship with inconnu spawning and overwintering areas.



Appendix Table A1. Number of commercial salmon fishermen fishing in Norton Sound 1970-1998.

Year	SUBDISTRICT 1	2	3	4	5	6	District [a] Totals
1970	6	33	21	0	12	45	[b]
1971	7	22	45	6	19	72	[b]
1972	20	20	48	32	20	71	[b]
1973	21	34	57	30	27	94	[b]
1974	25	25	60	8	23	53	[b]
1975	24	42	67	42	39	61	[b]
1976	21	22	54	27	37	60	[b]
1977	14	25	52	24	30	45	164
1978	16	24	44	26	26	51	176
1979	15	21	41	22	29	63	175
1980	14	17	26	13	26	66	159
1981	15	19	33	10	26	73	167
1982	18	17	28	10	32	68	164
1983	19	21	39	15	34	72	170
1984	8	22	25	8	24	74	141
1985	9	21	34	12	21	64	155
1986	13	24	34	9	30	73	163
1987	10	21	34	12	39	65	164
1988	5	21	36	13	21	69	152
1989	2	0	13	0	26	73	110
1990	0	15	23	0	28	73	128
1991	0	16	24	0	25	75	126
1992	2	1	21	9	25	71	110
1993	1	8	26	15	37	66	153
1994	1	5	21	0	39	71	119
1995	2	7	12	0	26	58	105
1996	1	4	12	0	20	54	86
1997	0	11	21	9	19	57	102
1998	0	16	23	0	28	52	82

[a] District total is the number of fishermen that actually fished in Norton Sound; Some fishermen may have fished more than one subdistrict.

[b] Data not available

Appendix Table A2. Commercial and subsistence salmon catches by species, by year in Nome Subdistrict, Norton Sound District, 1964-1998. [c]

NOME (SUBDISTRICT 1)

	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1964	5	-	-	1	1,194	1,200	-	-	-	-	-	-	5	-	-	1	1,194	1,200
1965	1	-	-	193	1,941	2,135	-	-	-	780	1,825	2,605	1	-	-	973	3,766	4,740
1966	1	-	32	1	581	615	12	-	-	1,794	1,762	3,568	13	-	32	1,795	2,343	4,183
1967	-	-	-	72	406	478	11	-	-	349	627	987	11	-	-	421	1,033	1,465
1968	-	-	-	50	102	152	7	-	-	6,507	621	7,135	7	-	-	6,557	723	7,287
1969	-	-	63	330	601	994	2	-	-	3,649	508	4,159	2	-	63	3,979	1,109	5,153
1970	-	-	6	55	960	1,021	-	-	35	5,001	458	5,494	0	-	41	5,056	1,418	6,515
1971	11	-	-	14	2,315	2,340	-	-	122	5,457	2,900	8,479	11	-	122	5,471	5,215	10,819
1972	15	-	-	12	2,643	2,670	19	-	52	4,684	315	5,070	34	-	52	4,696	2,958	7,740
1973	-	-	-	321	1,132	1,453	14	-	120	5,108	1,863	7,105	14	-	120	5,429	2,995	8,558
1974	19	-	123	7,722	10,431	18,295	8	-	5	3,818	183	4,014	27	-	128	11,540	10,614	22,309
1975	2	-	319	2,163	8,364	10,848	2	-	97	6,267	2,858	9,224	4	-	416	8,430	11,222	20,072
1976	2	10	26	1,331	7,620	8,989	13	-	189	5,492	1,705	7,399	15	10	215	6,823	9,325	16,388
1977	8	-	58	65	15,998	16,129	35	-	498	2,773	12,192	15,498	43	-	556	2,838	28,190	31,627
1978	19	-	-	22,869	8,782	31,670	35	-	225	13,063	4,295	17,618	54	-	225	35,932	13,077	49,288
1979	9	-	29	5,860	5,391	11,289	11	-	1,120	6,353	3,273	10,757	20	-	1,149	12,213	8,664	22,046
1980	8	-	-	10,007	13,922	23,937	129	-	2,157	22,246	5,983	30,515	137	-	2,157	32,253	19,905	54,452
1981	4	-	508	3,202	18,666	22,380	35	14	1,726	5,584	8,579	15,938	39	14	2,234	8,786	27,245	38,318
1982	20	-	1,183	18,512	13,447	33,162	21	6	1,829	19,202	4,831	25,889	41	6	3,012	37,714	18,278	59,051
1983	23	-	261	308	11,691	12,283	74	53	1,911	8,086	7,091	17,215	97	53	2,172	8,394	18,782	29,498
1984	7	-	820	-	3,744	4,571	83	16	1,795	17,182	4,883	23,959	90	16	2,615	17,182	8,627	28,530
1985	21	-	356	-	6,219	6,596	56	114	1,054	2,117	5,667	9,008	77	114	1,410	2,117	11,886	15,604
1986	6	-	50	-	8,160	8,216	150	107	688	8,720	8,085	17,750	156	107	738	8,720	16,245	25,966
1987	3	-	577	-	5,646	6,226	200	107	1,100	1,251	8,394	11,052	203	107	1,677	1,251	14,040	17,278
1988	2	-	54	182	1,628	1,866	63	133	1,076	2,159	5,952	9,383	65	133	1,130	2,341	7,580	11,249
1989	2	-	-	123	492	617	24	131	469	924	3,399	4,947	26	131	469	1,047	3,891	5,564
1990	0	0	-	-	-	-	58	234	510	2,233	4,246	7,281	58	234	510	2,233	4,246	7,281
1991	0	0	-	-	-	-	83	166	1,279	194	3,715	5,437	83	166	1,279	194	3,715	5,437
1992	1	2	693	185	881	1,762	152	163	1,481	7,351	1,684	10,831	153	165	2,174	7,536	2,565	12,593
1993	0	2	611	0	132	745	52	80	2,070	873	1,766	4,841	52	82	2,681	873	1,898	5,586
1994	0	1	287	0	66	354	23	69	983	6,556	1,673	9,304	23	70	1,270	6,556	1,739	9,658
1995	0	1	369	0	122	492	36	211	1,897	486	5,344	7,974	36	212	2,266	486	5,466	8,466
1996	0	0	9	13	3	25	19	353	1,317	5,802	4,333	11,824	19	353	1,326	5,815	4,336	11,849
1997	0	0	0	0	0	0	19	99	534	287	4,996	5,936	19	99	534	287	4,996	5,936
1998	0	0	0	0	0	0	15	14	1,057	4,797	964	6,847	15	14	1,057	4,797	964	6,847
5-year avg. [a]	0	1	255	3	65	323	30	162	1,360	2,801	3,622	7,976	30	163	1,615	2,803	3,687	8,299
10-year avg. [b]	1	1	202	50	332	586	53	164	1,162	2,687	3,711	7,776	53	165	1,364	2,737	4,043	8,362

[a] 1993-1997

[b] 1988-1997

[c] Subsistence harvest are incomplete prior to 1979.

Appendix Table A3. Commercial and subsistence salmon catches by species, by year in Golovin Subdistrict, Norton Sound District, 1962-1998.

GOLOVIN BAY (SUBDISTRICT 2)

	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1962	45	11	264	10,276	68,720	79,316	-	-	-	-	-	-	45	11	264	10,276	68,720	79,316
1963	40	40	-	19,677	49,850	69,607	-	-	118	5,702	9,319	15,139	40	40	118	25,379	59,169	84,746
1964	27	40	3	7,236	58,301	65,607	-	-	-	-	-	-	27	40	3	7,236	58,301	65,607
1965	-	-	-	-	-	-	2	-	49	1,523	3,847	5,421	2	-	49	1,523	3,847	5,421
1966	17	14	584	4,665	29,791	35,071	4	-	176	1,573	3,520	5,273	21	14	760	6,238	33,311	40,344
1967	10	-	747	5,790	31,193	37,740	3	-	185	2,774	4,803	7,765	13	-	932	8,564	35,996	45,505
1968	12	-	205	18,428	10,011	28,656	4	-	181	4,955	1,744	6,884	16	-	386	23,383	11,755	35,540
1969	28	-	1,224	23,208	20,949	45,409	2	-	190	2,760	2,514	5,466	30	-	1,414	25,968	23,463	50,875
1970	13	-	3	18,721	20,566	39,303	4	-	353	2,046	2,614	5,017	17	-	356	20,767	23,180	44,320
1971	37	-	197	2,735	33,824	36,793	7	-	191	1,544	1,936	3,678	44	-	388	4,279	35,760	40,471
1972	36	-	20	6,562	27,097	33,715	4	-	62	1,735	2,028	3,829	40	-	82	8,297	29,125	37,544
1973	70	-	183	14,145	41,689	56,087	1	-	48	9	74	132	71	-	231	14,154	41,763	56,219
1974	30	-	3	28,340	30,173	58,546	3	-	-	967	205	1,175	33	-	3	29,307	30,378	59,721
1975	17	-	206	10,770	41,761	52,754	-	-	1	2,011	2,025	4,037	17	-	207	12,781	43,786	56,791
1976	12	-	1,311	24,051	30,219	55,593	-	-	-	1,995	1,128	3,123	12	-	1,311	26,046	31,347	58,716
1977	26	-	426	7,928	53,912	62,292	3	-	80	703	2,915	3,701	29	-	506	8,631	56,827	65,993
1978	22	-	94	72,033	41,462	113,611	1	-	-	2,470	1,061	3,532	23	-	94	74,503	42,523	117,143
1979	75	49	1,606	45,948	30,201	77,879	-	-	845	2,546	2,840	6,231	75	49	2,451	48,494	33,041	84,110
1980	36	36	328	10,774	52,609	63,783	12	-	692	10,727	4,057	15,488	48	36	1,020	21,501	56,666	79,271
1981	23	5	13	49,755	58,323	108,119	8	-	1,520	5,158	5,543	12,229	31	5	1,533	54,913	63,866	120,348
1982	78	5	4,281	39,510	51,970	95,844	7	-	1,289	4,752	1,868	7,916	85	5	5,570	44,262	53,838	103,760
1983	52	10	295	17,414	48,283	66,054	-	-	-	-	-	-[c]	-	-	-	-	-	-
1984	31	-	2,462	88,588	54,153	145,234	-	-	-	-	-	-[c]	-	-	-	-	-	-
1985	193	113	1,196	3,019	55,781	60,302	12	2	430	1,904	9,577	11,925[c]	205	115	1,626	4,923	65,358	72,227
1986	81	8	958	25,425	69,725	96,197	-	-	-	-	-	-[c]	-	-	-	-	-	-
1987	166	51	2,203	1,579	44,334	48,333	-	-	-	-	-	-[c]	-	-	-	-	-	-
1988	108	921	2,149	31,559	33,348	68,085	-	-	-	-	-	-[c]	-	-	-	-	-	-
1989	-	-	-	-	-	-	-	-	-	-	-	-[c]	-	-	-	-	-	-
1990	52	21	0	0	15,993	16,066	-	-	-	-	-	-[c]	-	-	-	-	-	-
1991	49	1	0	0	14,839	14,889	-	-	-	-	-	-[c]	-	-	-	-	-	-
1992	6	9	2,085	0	1,002	3,102	-	-	-	-	-	-[c]	-	-	-	-	-	-
1993	1	4	2	8,480	2,803	11,290	-	-	-	-	-	-[c]	-	-	-	-	-	-
1994	0	0	3,424	0	111	3,535	253	168	733	8,410	1,337	10,901[d]	253	168	4,157	8,410	1,448	14,436
1995	0	0	1,616	4,296	1,987	7,899	165	34	1,649	7,818	10,373	20,039[d]	165	34	3,265	12,114	12,360	27,938
1996	0	0	638	0	0	638	86	134	3,014	17,399	2,867	23,500[d]	86	134	3,652	17,399	2,867	24,138
1997	19	2	102	20	8,003	8,146	138	427	555	4,570	4,891	10,581[d]	157	429	657	4,590	12,894	18,727
1998	1	0	3	106,761	723	107,488	184	37	1292	13340	1893	16747[d]	185	37	1,295	120,101	2,616	124,235
5-year avg.[a]	4	1	1,156	2,559	2,581	6,302	128	153	1,190	7,639	3,894	13,004	132	153	2,346	8,503	5,914	17,048
10-year avg.[b]	24	96	1,002	4,436	7,809	13,365	-	-	-	-	-	-	-	-	-	-	-	-

[a] 1993-1997

[b] 1988-1997

[c] Subsistence survey not conducted.

[d] Harvest estimated from Div. of Subsistence survey.

Appendix Table A4. Commercial and subsistence salmon catches by species, by year in Moses Point Subdistrict, Norton Sound District, 1962-1998.

MOSES POINT (SUBDISTRICT 3)																		
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1962	27	-	-	11,100	50,683	61,810	-	-	-	-	-	-	27	-	-	11,100	50,683	61,810
1963	15	-	-	2,549	46,274	48,838	5	-	-	5,808	8,316	14,129	20	-	-	8,357	54,590	62,967
1964	32	3	-	3,372	28,568	31,975	-	-	-	63	348	411	32	3	0	3,435	28,916	32,386
1965	-	-	-	-	-	-	16	-	72	1,325	9,857	11,270	16	-	72	1,325	9,857	11,270
1966	17	-	-	2,745	24,741	27,503	14	-	250	2,511	5,409	8,184	31	0	250	5,256	30,150	35,687
1967	-	-	-	-	-	-	39	-	116	1,322	9,913	11,390	39	-	116	1,322	9,913	11,390
1968	12	-	1	9,012	17,908	26,933	2	-	80	6,135	2,527	8,744	14	-	81	15,147	20,435	35,677
1969	29	-	-	11,807	26,594	38,430	9	-	109	1,790	1,303	3,211	38	-	109	13,597	27,897	41,641
1970	39	-	-	13,052	29,726	42,817	16	-	160	4,661	6,960	11,797	55	-	160	17,713	36,686	54,614
1971	95	-	4	922	43,831	44,852	16	-	271	1,046	2,227	3,560	111	-	275	1,968	46,058	48,412
1972	190	-	11	5,866	30,919	36,986	44	-	108	1,579	2,070	3,801	234	-	119	7,445	32,989	40,787
1973	134	-	-	10,603	31,389	42,126	2	-	-		298	300	136	-	-	10,603	31,687	42,426
1974	198	-	9	12,821	55,276	68,304	3	-	-	2,382	1,723	4,108	201	-	9	15,203	56,999	72,412
1975	16	-	-	4,407	46,699	51,122	2	-	6	1,280	508	1,796	18	-	6	5,687	47,207	52,918
1976	24	-	232	5,072	10,890	16,218	22	-	-	5,016	1,548	6,586	46	-	232	10,088	12,438	22,804
1977	96	-	6	9,443	47,455	57,000	22	-	225	1,145	1,170	2,562	118	-	231	10,588	48,625	59,562
1978	444	-	244	39,694	44,595	84,977	38	-	407	1,995	1,229	3,669	482	-	651	41,689	45,824	88,646
1979	1,035	-	177	40,811	37,123	79,146	16	-	890	6,078	1,195	8,179	1,051	-	1,067	46,889	38,318	87,325
1980	502	-	-	1,435	14,755	16,692	131	-	229	4,232	1,393	5,985	633	-	229	5,667	16,148	22,677
1981	198	-	5	26,417	29,325	55,945	32	-	2,345	6,530	2,819	11,726	230	-	2,350	32,947	32,144	67,671
1982	253	-	318	9,849	40,030	50,450	1	-	1,835	3,785	3,537	9,158	254	-	2,153	13,634	43,567	59,608
1983	254	-	-	17,027	65,776	83,057	-	-	-	-	-	- [c]	-	-	-	-	-	-
1984	-	-	5,959	28,035	9,477	43,471	-	-	-	-	-	- [c]	-	-	-	-	-	-
1985	816	32	1,803	559	24,466	27,676	67	-	1,389	1,212	947	3,615	883	32	3,192	1,771	25,413	31,291
1986	600	41	5,874	15,795	20,668	42,978	-	-	-	-	-	- [c]	-	-	-	-	-	-
1987	907	15	64	568	17,278	18,832	-	-	-	-	-	- [c]	-	-	-	-	-	-
1988	663	93	3,974	13,703	18,585	37,018	-	-	-	-	-	- [c]	-	-	-	-	-	-
1989	62	-	-	-	167	229	-	-	-	-	-	- [c]	-	-	-	-	-	-
																-	-	-
1990	202	0	0	501	3,723	4,426	-	-	-	-	-	- [c]	-	-	-	-	-	-
1991	161	0	0	0	804	965	312	-	2,153	3,555	2,660	8,680 [d]	473	-	2,153	3,555	3,464	9,645
1992	0	0	3,531	0	6	3,537	100	-	1,281	6,152	1,260	8,793 [d]	100	-	4,812	6,152	1,266	12,330
1993	3	0	4,065	0	167	4,235	368	-	1,217	1,726	1,635	4,946 [d]	371	-	5,282	1,726	1,802	9,181
1994	0	0	5,345	0	414	5,759	322	104	1,180	9,345	3,476	14,427 [d]	322	104	6,525	9,345	3,890	20,186
1995	4	44	3,742	2,962	1,171	7,923	284	17	1,353	2,046	3,774	7,474 [d]	288	61	5,095	5,008	4,945	15,397
1996	0	0	1,915	68,609	0	70,524	417	52	1,720	9,442	2,319	13,951 [d]	417	52	3,635	78,051	2,319	84,475
1997	844	0	1,409	0	2,683	4,936	619	50	1,213	1,314	2,064	5,261 [d]	1,463	50	2,622	1,314	4,747	10,197
1998	105	0	1,462	145,669	2,311	149,547	414	49	1,831	6,891	1,376	10,561 [d]	519	49	3,293	152,560	3,687	160,108
5-year avg. [a]	170	9	3,295	14,314	887	18,675	402	45	1,337	4,775	2,654	9,212	572	53	4,632	19,089	3,541	27,887
10-year avg. [b]	194	15	2,665	9,531	2,772	13,955	-	-	-	-	-	-	-	-	-	-	-	-

[a] 1993-1997

[b] 1988-1

[c] Subsi ey not conducted.

[d] Harves ed from Div. of Subsistence survey.

Appendix Table A5 Commercial and subsistence salmon catches by species, by year in Norton Bay Subdistrict, Norton Sound District, 1962-1998.

NORTON BAY (SUBDISTRICT 4)

	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1962	387	7	40	4,402	24,380	29,216	-	-	-	-	-	-	387	7	40	4,402	24,380	29,216
1963	137	2	-	17,676	12,469	30,284	-	-	-	5,097	-	5,097	137	2	-	22,773	12,469	35,381
1964	50	3	-	988	5,916	6,957	-	-	-	-	-	-	50	3	-	988	5,916	6,957
1965	-	-	-	-	-	-	4	-	22	252	3,032	3,310	4	-	22	252	3,032	3,310
1966	-	-	-	-	-	-	7	-	41	929	3,612	4,589	7	-	41	929	3,612	4,589
1967	-	-	-	-	-	-	12	-	14	1,097	2,945	4,068	12	-	14	1,097	2,945	4,068
1968	-	-	-	-	-	-	28	-	71	1,916	1,872	3,887	28	-	71	1,916	1,872	3,887
1969	26	-	-	4,849	3,974	8,849	59	-	189	2,115	3,855	6,218	85	-	189	6,964	7,829	15,067
1970	-	-	-	-		-	3	-	10	840	3,500	4,353	3	-	10	840	3,500	4,353
1971	-	-	-	-	-	-	5	-	47	92	2,619	2,763	5	-	47	92	2,619	2,763
1972	43	-	-	1,713	7,799	9,555	30	-	44	2,089	2,022	4,185	73	-	44	3,802	9,821	13,740
1973	28	-	-	1,645	4,672	6,345	1	-	-	10	130	141	29	-	-	1,655	4,802	6,486
1974	21	-	-	654	3,826	4,501	-	-	-	17	900	917	21	-	-	671	4,726	5,418
1975	68	-	89	1,137	17,385	18,679	1	-	-	93	361	455	69	-	89	1,230	17,746	19,134
1976	102	-	95	4,456	7,161	11,814	2	-	-	41	236	279	104	-	95	4,497	7,397	12,093
1977	158	-	1	2,495	13,563	16,217	14	-	-	420	2,055	2,489	172	-	1	2,915	15,618	18,706
1978	470	-	144	8,471	21,973	31,058	12	-	21	1,210	1,060	2,303	482	-	165	9,681	23,033	33,361
1979	856	-	2,547	6,201	15,599	25,203	12	-	697	735	1,400	2,844	868	-	3,244	6,936	16,999	28,047
1980	340	-	-	47	7,855	8,242	22	-	33	4,275	1,132	5,462	362	-	33	4,322	8,987	13,704
1981	63	-	-	177	3,111	3,351	7	-	82	2,314	3,515	5,918	70	-	82	2,491	6,626	9,269
1982	96	-	2,332	2,535	7,128	12,091	1	-	484	2,600	2,485	5,570	97	-	2,816	5,135	9,613	17,661
1983	215	-	204	3,935	17,157	21,511	-	-	-	-	-	- [c]	-	-	-	-	-	-
1984	-	-	-	1,162	3,442	4,604	-	-	-	-	-	- [c]	-	-	-	-	-	-
1985	528	-	384	68	9,948	10,928	-	-	-	-	-	- [c]	-	-	-	-	-	-
1986	139	2	1,512	40	1,994	3,687	-	-	-	-	-	- [c]	-	-	-	-	-	-
1987	544	-	145	16	3,586	4,291	-	-	-	-	-	- [c]	-	-	-	-	-	-
1988	434	2	709	1,749	7,521	10,415	-	-	-	-	-	- [c]	-	-	-	-	-	-
1989	-	-	-	-	-	-	-	-	-	-	-	- [c]	-	-	-	-	-	-
1990 [d]	0	0	0	0	0	0	-	-	-	-	-	- [c]	-	-	-	-	-	-
1991 [d]	0	0	0	0	0	0	-	-	-	-	-	- [c]	-	-	-	-	-	-
1992	27	0	0	0	1,787	1,814	-	-	-	-	-	- [c]	-	-	-	-	-	-
1993	267	0	0	290	1,378	1,935	-	-	-	-	-	- [c]	-	-	-	-	-	-
1994	0	0	0	0	0	0	308	1	370	6,049	4,581	11,309 *	308	1	370	6,049	4,581	11,309
1995	0	0	0	0	0	0	475	46	985	3,514	5,828	10,848 *	475	46	985	3,514	5,828	10,848
1996	0	0	0	0	0	0	295	3	676	3,929	4,161	9,064 *	295	3	676	3,929	4,161	9,064
1997	194	0	0	0	531	725	656	54	322	1,795	4,040	6,777 *	850	54	322	1,795	4,571	7,502
1998	0	0	0	0	0	0	684	0	388	2,009	6,192	9,274 *	684	0	388	2,009	6,192	9,274
5-year avg. [a]	92	0	0	58	382	532	347	21	471	3,057	3,722	7,600	386	21	471	3,057	3,828	7,745
10-year avg. [b]	84	0	64	185	1,020	1,354	-	-	-	-	-	-	-	-	-	-	-	-

[a] 1993-1997

[b] 1988-1997

[c] Subsistence survey not conducted.

[d] No commercial harvest reported.

* Harvest estimated from Div. of Subsistence survey.

Appendix Table A6. Commercial and subsistence salmon catches by species, by year in Shaktoolik Subdistrict, Norton Sound District, 1961-1998.

SHAKTOOLIK (SUBDISTRICT 5)

	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1961	140	-	-	29,075	24,746	53,961	-	-	-	-	-	-	140	-	-	29,075	24,746	53,961
1962	1,738	-	2,113	640	8,718	13,209	-	-	-	-	-	-	1,738	-	2,113	640	8,718	13,209
1963	480	11	563	5,138	19,153	25,345	-	-	-	-	-	-	480	11	563	5,138	19,153	25,345
1964	631	79	16	1,969	35,272	37,967	77	-	340	2,132	5,412	7,961	708	79	356	4,101	40,684	45,928
1965	127	30	-	3	8,356	8,516	31	-	107	3,763	3,420	7,321	158	30	107	3,766	11,776	15,837
1966	310	-	956	344	8,292	9,902	142	-	762	1,445	4,183	6,532	452	-	1,718	1,789	12,475	16,434
1967	43	-	88	1,050	1,655	2,836	262	-	387	2,010	4,436	7,095	305	-	475	3,060	6,091	9,931
1968	61	-	130	2,205	2,504	4,900	10	-	458	6,355	1,915	8,738	71	-	588	8,560	4,419	13,638
1969	33	-	276	6,197	8,645	15,151	40	-	193	4,018	3,439	7,690	73	-	469	10,215	12,084	22,841
1970	197	-	155	2,301	15,753	18,406	43	-	210	2,474	2,016	4,743	240	-	365	4,775	17,769	23,149
1971	284	-	238	28	13,399	13,949	87	-	329	494	5,060	5,970	371	-	567	522	18,459	19,919
1972	419	-	11	2,798	12,022	15,250	64	-	235	939	3,399	4,637	483	-	246	3,737	15,421	19,887
1973	289	-	177	6,450	14,500	21,416	51	-	130	3,410	1,397	4,988	340	-	307	9,860	15,897	26,404
1974	583	-	179	5,650	26,391	32,803	93	-	353	1,901	358	2,705	676	-	532	7,551	26,749	35,508
1975	651	2	812	1,774	49,536	52,775	18	-	14	1,394	334	1,760	669	2	826	3,168	49,870	54,535
1976	892	-	129	15,803	15,798	32,622	24	-	121	1,188	269	1,602	916	-	250	16,991	16,067	34,224
1977	1,521	4	418	7,743	36,591	46,277	49	-	170	585	2,190	2,994	1,570	4	588	8,328	38,781	49,271
1978	1,339	7	1,116	46,236	35,388	84,086	81	-	15	3,275	1,170	4,541	1,420	7	1,131	49,511	36,558	88,627
1979	2,377	-	3,383	18,944	22,030	46,734	62	-	1,605	2,575	1,670	5,912	2,439	-	4,988	21,519	23,700	52,646
1980	1,086	-	8,001	1,947	27,453	38,487	57	-	756	3,227	1,827	5,867	1,143	-	8,757	5,174	29,280	44,354
1981	1,484	4	1,191	29,695	21,097	53,471	8	-	525	2,225	3,490	6,248	1,492	4	1,716	31,920	24,587	59,719
1982	1,677	3	22,233	17,019	26,240	67,172	68	-	2,138	3,865	1,165	7,236	1,745	3	24,371	20,884	27,405	74,408
1983	2,742	4	12,877	12,031	67,310	94,964	-	-	-	-	-	-	- [c]	-	-	-	-	-
1984	1,613	-	10,730	1,596	32,309	46,248	-	-	-	-	-	-	- [c]	-	-	-	-	-
1985	5,312	-	2,808	-	13,403	21,523	298	-	1,379	24	298	1,999	5,610	-	4,187	24	13,701	23,522
1986	1,075	29	6,626	-	16,126	23,856	-	-	-	-	-	-	- [c]	-	-	-	-	-
1987	2,214	-	6,193	-	14,088	22,495	-	-	-	-	-	-	- [c]	-	-	-	-	-
1988	671	79	6,096	3,681	21,521	32,048	-	-	-	-	-	-	- [c]	-	-	-	-	-
1989	1,241	43	8,066	-	19,641	28,991	-	-	-	-	-	-	- [c]	-	-	-	-	-
1990	2,644	49	4,695	-	21,748	29,136	-	-	-	-	-	-	- [c]	-	-	-	-	-
1991	1,324	55	11,614	-	31,619	44,612	-	-	-	-	-	-	- [c]	-	-	-	-	-
1992	1,098	56	14,660	-	27,867	43,681	-	-	-	-	-	-	- [c]	-	-	-	-	-
1993	2,756	20	11,130	106,743	20,864	141,513	-	-	-	-	-	-	- [c]	-	-	-	-	-
1994	885	8	22,065	502,231	5,411	530,600	1,175	1	2,777	9,133	1,221	14,307 [d]	2,060	9	24,842	511,364	6,632	544,907
1995	1,239	5	10,856	37,377	14,775	64,252	1,275	2,480	2,626	7,024	2,480	15,885 [d]	2,514	2,485	13,482	44,401	17,255	80,137
1996	1,340	1	13,444	304,982	3,237	323,004	1,114	31	3,615	8,370	4,425	17,555 [d]	2,454	32	17,059	313,352	7,662	340,559
1997	2,449	-	4,694	-	5,747	12,890	1,146	62	2,761	5,779	1,612	11,360 [d]	3,595	62	7,455	5,779	7,359	24,250
1998	910	-	3,624	236,171	7,080	247,785	982	92	1,872	6,270	1,034	10,250 [d]	1,892	92	5,496	242,441	8,114	258,035
5-year avg. [a]	1,734	7	12,438	190,267	10,007	214,452	942	515	2,356	6,061	1,948	11,821	2,125	518	12,568	174,979	7,782	197,971
10-year avg. [b]	1,565	32	10,732	95,501	17,243	125,073	-	-	-	-	-	-	-	-	-	-	-	-

[a] 1993-19

[b] 1988-

[c] Subsist ey not conducted.

[d] Harvest estimated from Div. of Subsistece survey.

Appendix Table A7 Commercial and subsistence salmon catches by species, by year in Unalakleet Subdistrict, Norton Sound District, 1961-1998.

UNALAKLEET (SUBDISTRICT 6)

	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1961	5,160	35	13,807	5,162	23,586	47,750	-	-	-	-	-	-	5,160	35	13,807	5,162	23,586	47,750
1962	5,089	-	6,739	6,769	30,283	48,880	-	-	-	-	-	-	5,089	-	6,739	6,769	30,283	48,880
1963	5,941	18	16,202	1,140	27,003	50,304	-	-	-	-	-	-	5,941	18	16,202	1,140	27,003	50,304
1964	1,273	1	79	1	19,611	20,965	488	-	2,227	7,030	6,726	16,471	1,761	1	2,306	7,031	26,337	37,436
1965	1,321	-	2,030	24	26,498	29,873	521	-	4,562	11,488	8,791	25,362 [c]	1,842	-	6,592	11,512	35,289	55,235
1966	1,208	-	4,183	5,023	16,840	27,254	90	-	789	6,083	3,387	10,349 [c]	1,298	-	4,972	11,106	20,227	37,603
1967	1,751	-	1,544	21,961	8,502	33,758	490	-	484	9,964	-	10,938 [c]	2,241	-	2,028	31,925	8,502	44,696
1968	960	-	6,549	41,474	14,865	63,848	186	-	1,493	11,044	2,982	15,705 [c]	1,146	-	8,042	52,518	17,847	79,553
1969	2,276	-	5,273	40,558	22,032	70,139	324	-	1,483	4,230	4,196	10,233 [c]	2,600	-	6,756	44,788	26,228	80,372
1970	1,604	-	4,261	30,779	40,029	76,673	495	-	3,907	10,104	7,214	21,720 [c]	2,099	-	8,168	40,883	47,243	98,393
1971	2,166	-	2,688	1,196	37,543	43,593	911	-	3,137	2,230	7,073	13,351 [c]	3,077	-	5,825	3,426	44,616	56,944
1972	2,235	-	412	28,231	20,440	51,318	643	-	1,818	3,132	4,132	9,725 [c]	2,878	-	2,230	31,363	24,572	61,043
1973	1,397	-	8,922	13,335	25,716	49,370	323	-	213	6,233	3,426	10,195	1,720	-	9,135	19,568	29,142	59,565
1974	2,100	-	1,778	93,332	36,170	133,380	313	-	706	7,341	588	8,948	2,413	-	2,484	100,673	36,758	142,328
1975	1,638	-	3,167	12,137	48,740	65,682	163	-	74	4,758	2,038	7,033	1,801	-	3,241	16,895	50,778	72,715
1976	1,211	1	5,141	37,203	24,268	67,824	142	-	694	4,316	2,832	7,984	1,353	1	5,835	41,519	27,100	75,808
1977	2,691	1	2,781	21,001	32,936	59,410	723	-	1,557	8,870	6,085	17,235	3,414	1	4,338	29,871	39,021	76,645
1978	7,525	5	5,737	136,200	37,079	186,546	1,044	-	2,538	13,268	3,442	20,292	8,569	5	8,275	149,468	40,521	206,838
1979	6,354	8	23,696	49,647	30,445	110,150	640	-	3,330	6,960	1,597	12,527	6,994	8	27,026	56,607	32,042	122,677
1980	4,339	3	21,512	203,142	64,198	293,194	1,046	-	4,758	19,071	5,230	30,105	5,385	3	26,270	222,213	69,428	323,299
1981	6,157	47	29,845	123,233	39,186	198,468	869	24	5,808	5,750	4,235	16,686	7,026	71	35,653	128,983	43,421	215,154
1982	3,768	2	61,343	142,856	44,520	252,489	913	2	7,037	20,045	4,694	32,691	4,681	4	68,380	162,901	49,214	285,180
1983	7,022	13	36,098	26,198	109,220	178,551	1,868	33	6,888	13,808	4,401	26,998	8,890	46	42,986	40,006	113,621	205,549
1984	6,804	6	47,904	-	43,317	98,031	1,650	1	6,675	17,418	3,348	29,092	8,454	7	54,579	17,418	46,665	127,123
1985	12,621	21	15,421	1	25,111	53,175	1,397	3	2,244	55	1,968	5,667	14,018	24	17,665	56	27,079	58,842
1986	4,494	153	20,580	-	30,239	55,466	-	-	-	-	-	- [d]	-	-	-	-	-	-
1987	3,246	141	15,097	97	17,525	36,106	-	-	-	-	-	- [d]	-	-	-	-	-	-
1988	2,218	157	24,232	23,730	25,363	75,700	-	-	-	-	-	- [d]	-	-	-	-	-	-
1989	4,402	222	36,025	-	20,825	61,474	-	-	4,681	17,500	1,388	- [e]	-	-	-	-	-	-
1990	5,998	358	52,015	-	23,659	82,030	2,476 [e]	-	-	-	-	-	-	-	-	-	-	-
1991	4,534	147	52,033	-	39,609	96,323	-	-	-	-	-	- [d]	-	-	-	-	-	-
1992	3,409	229	84,449	6,284	52,547	146,918	-	-	-	-	-	- [d]	-	-	-	-	-	-
1993	5,944	251	26,290	42,061	28,156	102,702	-	-	-	-	-	- [d]	-	-	-	-	-	-
1994	4,400	71	71,019	480,158	12,288	567,936	5,294	819	16,081	31,572	12,732	66,498 [f]	9,694	890	87,100	511,730	25,020	634,434
1995	7,617	78	31,280	37,009	24,843	100,827	5,049	807	13,110	17,246	13,460	49,672 [f]	12,666	885	44,390	54,255	38,303	150,499
1996	3,644	-	52,200	113,837	7,369	177,050	5,324	608	15,963	19,782	16,481	58,157 [f]	8,968	608	68,163	133,619	23,850	235,207
1997	9,067	159	26,079	-	17,139	52,444	6,325	353	9,120	10,804	7,649	34,251 [f]	15,392	512	35,199	10,804	24,788	86,695
1998	6,413	7	24,534	99,412	6,210	136,576	3,963	201	7,303	13,173	2,551	27,191 [f]	10,376	208	31,837	112,585	8,761	163,767
5-year avg. [a]	6,134	112	41,374	134,613	17,959	200,192	4,398	517	10,855	15,881	10,064	41,716	9,344	579	46,970	142,082	22,392	221,367
10-year avg. [b]	5,123	167	45,562	70,308	25,180	146,340	-	-	-	-	-	-	-	-	-	-	-	-

[a] 1993-1997

[b] 1988-1997

[c] Subsistence catches from 1966-72 includes fish taken at St. Michael.

[d] Subsistence surveys not conducted.

[e] In-depth survey by Subsistence Division.

[f] Harvest estimate from Div. of Subsistence survey. Includes harvest in Stebbins and St. Michael.

Appendix Table A8. Commercial and subsistence salmon catches by species, by year for all subdistricts in Norton Sound District, 1961-1998.

ALL SUBDISTRICTS

	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1961	5,300	35	13,807	34,327	48,332	101,801	-	-	-	-	-	-	5,300	35	13,807	34,327	48,332	101,801
1962	7,286	18	9,156	33,187	182,784	232,431	-	-	-	-	-	-	7,286	18	9,156	33,187	182,784	232,431
1963	6,613	71	16,765	55,625	154,789	233,863	5	-	118	16,607	17,635	34,365	6,618	71	16,883	72,232	172,424	268,228
1964	2,018	126	98	13,567	148,862	164,671	565	-	2,567	9,225	12,486	24,843	2,583	126	2,665	22,792	161,348	189,514
1965	1,449	30	2,030	220	36,795	40,524	574	-	4,812	19,131	30,772	55,289	2,023	30	6,842	19,351	67,567	95,813
1966	1,553	14	5,755	12,778	80,245	100,345	269	-	2,210	14,335	21,873	38,687	1,822	14	7,965	27,113	102,118	139,032
1967	1,804	-	2,379	28,879	41,756	74,818	817	-	1,222	17,516	22,724	42,279	2,621	-	3,601	46,395	64,480	117,097
1968	1,045	-	6,885	71,179	45,300	124,409	237	-	2,391	36,912	11,661	51,201	1,282	-	9,276	108,091	56,961	175,610
1969	2,392	-	6,836	86,949	82,795	178,972	436	-	2,191	18,562	15,615	36,804	2,828	-	9,027	105,511	98,410	215,776
1970	1,853	-	4,423	64,908	107,034	178,218	561	-	4,675	26,127	22,763	54,126	2,414	-	9,098	91,035	129,797	232,344
1971	2,593	-	3,127	4,895	131,362	141,977	1,026	197	4,097	10,863	21,618	37,801	3,619	197	7,224	15,758	152,980	179,778
1972	2,938	-	454	45,182	100,920	149,494	804	93	2,319	14,158	13,873	31,247	3,742	-	2,773	59,340	114,793	180,741
1973	1,918	-	9,282	46,499	119,098	176,797	392	-	520	14,770	7,185	22,867	2,310	-	9,802	61,269	126,283	199,664
1974	2,951	-	2,092	148,519	162,267	315,829	420	-	1,064	16,426	3,958	21,868	3,371	-	3,156	164,945	166,225	337,697
1975	2,393	2	4,593	32,388	212,485	251,861	186	11	192	15,803	8,113	24,305	2,579	13	4,785	48,191	220,598	276,166
1976	2,243	11	6,934	87,919	95,956	193,063	203	-	1,004	18,048	7,718	26,973	2,446	11	7,938	105,967	103,674	220,036
1977	4,500	5	3,690	48,675	200,455	257,325	846	-	2,530	14,296	26,607	44,279	5,346	5	6,220	62,971	227,062	301,604
1978	9,819	12	7,335	325,503	189,279	531,948	1,211	-	2,981	35,281	12,257	51,730	11,030	12	10,316	360,784	201,536	583,678
1979	10,706	57	31,438	167,411	140,789	350,401	747	-	8,487	25,247	11,975	46,456	11,453	57	39,925	192,658	152,764	396,857
1980	6,311	40	29,842	227,352	180,792	444,337	1,397	-	8,625	63,778	19,622	93,422	7,708	40	38,467	291,130	200,414	537,759
1981	7,929	56	31,562	232,479	169,708	441,734	2,021	38	13,416	28,741	32,866	77,082 [c]	9,950	94	44,978	261,220	202,574	518,816
1982	5,892	10	91,690	230,281	183,335	511,208	1,011	8	14,612	54,249	18,580	88,460 [c]	6,903	18	106,302	284,530	201,915	599,668
1983	10,308	27	49,735	76,913	319,437	456,420	-	-	-	-	-	- [d]	-	-	-	-	-	-
1984	8,455	6	67,875	119,381	146,442	342,159	-	-	-	-	-	- [d]	-	-	-	-	-	-
1985	19,491	166	21,968	3,647	134,928	180,200	-	-	-	-	-	- [d]	-	-	-	-	-	-
1986	6,395	233	35,600	41,260	146,912	230,400	-	-	-	-	-	- [d]	-	-	-	-	-	-
1987	7,080	207	24,279	2,260	102,457	136,283	-	-	-	-	-	- [d]	-	-	-	-	-	-
1988	4,096	1,252	37,214	74,604	107,966	225,132	-	-	-	-	-	- [d]	-	-	-	-	-	-
1989	5,707	265	44,091	123	42,625	92,811	-	-	-	-	-	- [d]	-	-	-	-	-	-
1990	8,895	434	56,712	501	65,123	131,665	-	-	-	-	-	- [d]	-	-	-	-	-	-
1991	6,068	203	63,647	-	86,871	156,789	-	-	-	-	-	- [d]	-	-	-	-	-	-
1992	4,541	296	105,418	6,284	83,394	199,933	-	-	-	-	-	- [d]	-	-	-	-	-	-
1993	8,972	279	43,283	157,574	53,562	263,670	-	-	-	-	-	- [d]	-	-	-	-	-	-
1994 [c,e]	5,285	80	102,140	982,389	18,290	1,108,184	7,374	1,161	22,124	71,066	25,020	126,745	12,659	1,241	124,264	1,053,455	43,310	1,234,929
1995 [c,e]	8,860	128	47,862	81,644	42,898	181,392	7,766	1,222	23,015	38,594	43,014	113,611	16,626	1,350	70,877	120,238	85,912	295,003
1996 [c,e]	4,984	1	68,206	487,441	10,609	571,241	7,255	1,182	26,304	64,724	34,585	134,050	12,239	1,183	94,510	552,165	45,194	705,291
1997 [c,e,f]	12,573	161	32,284	20	34,103	79,141	8,998	1,892	16,476	27,200	26,803	81,370	21,571	2,053	48,760	27,220	60,906	160,511
1998 [c,e,f]	7,429	7	29,623	588,013	16,324	641,396	8,295	1,214	19,007	51,933	20,032	100,480	15,724	1,221	48,630	639,946	36,356	741,876
5-year avg. [a]	8,135	130	58,755	341,814	31,892	440,726	6,279	1,091	17,584	40,317	25,884	91,155	12,619	1,165	67,682	350,616	47,064	479,147
10-year avg. [b]	6,998	310	60,086	179,058	54,544	300,996	-	-	-	-	-	-	-	-	-	-	-	-

[a] 1993-1997

[b] 1988-19[illegible]

[c] These [illegible] include subsistence estimates data from Stebbins and St. Michael.

[d] Subsis[illegible]eys not conducted.

[e] Subsistence harvest estimate from Div. of Subsistence survey.

[f] 1[illegible]sistece [illegible]lude S[illegible] and Ga[illegible]

Appendix Table A9. Mean salmon weights, Norton Sound District, 1964-1998.

	Mean Round Weight in Pounds [a]			
Year	Chinook	Coho	Pink	Chum
1964	-	-	-	7.0
1965	-	-	2.3	7.1
1966	-	-	3.5	7.8
1967	23.7	7.0	3.6	7.2
1968	20.0	7.0	4.0	7.5
1969	19.3	7.5	3.6	6.4
1970	20.0	7.0	3.5	7.8
1971	23.7	7.0	3.6	7.2
1972	20.0	7.3	2.8	6.9
1973	20.3	6.8	3.9	7.1
1974	18.2	6.7	3.4	6.6
1975	10.8	7.4	2.9	6.5
1976	15.2	7.2	3.1	7.0
1977	22.7	7.6	3.3	7.0
1978	22.8	6.9	3.6	7.4
1979	22.9	7.1	3.6	7.2
1980	21.5	6.8	3.2	7.2
1981	20.7	6.7	3.5	7.6
1982	16.5	7.1	2.9	7.3
1983	17.4	7.2	3.6	7.4
1984	20.0	7.7	2.9	7.0
1985	21.5	7.7	3.1	7.0
1986	20.8	6.9	3.2	6.9
1987	20.0	7.3	3.0	7.1
1988	16.4	7.5	3.0	7.1
1989	18.4	7.6	3.6	7.0
1990	19.0	7.5	-	7.4
1991	17.7	7.4	-	6.9
1992 [b]	12.7	7.8	2.9	7.1
1993	16.9	6.6	2.6	6.5
1993	18.6	7.5	2.2	6.7
1995	19.7	7.4	2.4	6.7
1996	19.2	8.4	2.4	7.9
1997	17.9	7.3	2.5	7.4
1998	17.2	7.9	2.3	6.5

[a] Based on age-weight-length samples or fish tickets.

[b] Low chinook weight due to restricted mesh size.

Appendix Table A10. Estimated mean prices paid to commercial salmon fishermen, Norton Sound District, 1962 - 1998.

Year	Chinook	Coho	Pink	Chum
		Price Per Fish		
1962	$3.85	$0.60	$0.25	$0.35
1963	$3.85	$0.60	$0.25	$0.35
1964	$4.50	-	$0.25	$0.40
1965	$3.75	$0.45	-	$0.40
1966	$4.80	$1.05	$0.25	$0.65
		Price Per Pound		
1967	$0.20	$0.14	$0.07	$0.09
1968	$0.25	$0.14	$0.06	$0.10
1969	$0.22	$0.14	$0.06	$0.11
1970	$0.25	$0.14	$0.06	$0.10
1971	$0.25	$0.14	$0.07	$0.10
1972	$0.27	$0.16	$0.06	$0.11
1973	$0.40	$0.16	$0.07	$0.32
1974	$0.40	$0.16	$0.13	$0.32
1975	$0.40	$0.16	$0.13	$0.24
1976	$0.50	$0.32	$0.17	$0.30
1977	$0.65	$0.40	$0.16	$0.30
1978	$0.65	$0.35	$0.20	$0.30
1979	$0.88	$0.66	$0.16	$0.41
1980	$0.74	$0.63	$0.07	$0.23
1981	$1.25	$0.62	$0.13	$0.26
1982	$1.25	$0.57	$0.12	$0.32
1983	$1.13	$0.39	$0.11	$0.28
1984	$1.20	$0.45	$0.11	$0.24
1985	$1.08	$0.48	$0.20	$0.31
1986	$0.88	$0.52	$0.15	$0.27
1987	$1.11	$0.57	$0.20	$0.33
1988	$1.26	$1.13	$0.19	$0.39
1989	$0.73	$0.43	$0.10	$0.18
1990	$1.01	$0.50	$0.75 [a]	$0.23
1991 [b]	$0.87	$0.36	-	$0.27
1992 [c]	$0.66	$0.33	$0.16	$0.22
1993 [d]	$0.72	$0.22	$0.15	$0.24
1994	$1.02	$0.52	$0.15	$0.29
1995	$0.66	$0.43	$0.18	$0.18
1996	$0.54	$0.28	$0.10	$0.08
1997	$1.00	$0.47	$0.06	$0.11
1998	$0.74	$0.29	$0.14	$0.09

[a] Price paid per pound of roe.

[b] Price paid for coho and chum roe was $3.00 per pound.

[c] Price paid for coho roe was $1.50 per pound.

[d] Price paid for coho roe was $1.76 per pound and $0.40 per pound for sockeye.

Appendix Table A11. Dollar estimates of Norton Sound District commercial salmon fishery, 1961 - 1998.

Year	Gross Value of Catch to Fishermen	Wages Earned [b]	License and Tax Revenues to State (License Fees Only)
1961	[a]	[a]	$2,010.00
1962	$105,800.00	[a]	$16,341.00
1963	$104,000.00	[a]	$18,009.00
1964	$51,000.00	[a]	$11,305.00
1965	$21,483.00	[a]	$5,084.00
1966	$68,000.00	[a]	$4,680.00
1967	$44,038.00	$58,000.00	$3,500.00
1968	$63,700.00	[a]	$4,000.00
1969	$95,297.00	$72,145.00	[a]
1970	$99,019.00	$55,100.00	$5,595.00
1971	$101,000.00	$65,500.00	$5,730.00
1972	$102,225.00	$68,700.00	$7,000.00
1973	$308,740.00	$81,000.00	$15,400.00
1974	$437,127.00	$129,600.00	$20,028.00
1975	$413,255.00	$172,800.00	$28,230.00
1976	$285,283.00	[a]	$10,133.00
1977	$528,610.00	[a]	$11,386.00
1978	$814,221.00	[a]	$12,002.00
1979	$876,547.00	[a]	$11,780.00
1980	$583,388.00	[a]	$11,640.00 [c]
1981	$758,471.00	[a]	$11,940.00
1982	$988,588.00	[a]	$7,155.00 [c d]
1983	$1,038,967.00	[a]	$10,700.00 [c]
1984	$721,055.00	[a]	$9,690.00 [c]
1985	$822,056.00	[a]	$5,820.00 [e]
1986	$539,576.00	[a]	$5,970.00 [e]
1987	$504,631.00	[a]	$5,940.00 [e]
1988	$754,751.00	[a]	$10,050.00 [e f]
1989	$274,817.00	[a]	$10,300.00 [e]
1990	$497,623.00	[a]	$10,350.00 [e]
1991	$425,430.00	[a]	$10,250.00 [e]
1992	$448,395.00	[a]	$10,200.00 [e]
1993	$322,117.00	[a]	$8,835.00 [e]
1994	$864,882.00	[a]	$10,000.00 [e]
1995	$356,912.00	[a]	$5,250.00 [e]
1996	$340,347.00	[a]	$4,300.00 [e]
1997	$363,907.48	[a]	$5,100.00 [e]
1998	$358,982.00	[a]	$4,100.00 [e]

[a] Information not available.

[b] Includes wages paid to tender boat operators, processing plant employees in district.

[c] Includes only permit renewals and vessel license fees.

[d] The Alaska state legislature lowered all resident permit renewal fees and vessel license fees to poverty level fees for 1982.

[e] Includes only permit renewal fees.

[f] The Alaska state legislature raised resident permit renewal fee to $50.00 in 1988.

Appendix Table A12. Round weight of commercially caught salmon by species, Norton Sound District, 1961 - 1998.

	Pounds Caught (Round Wt. in Lbs)				
Year	Chinook	Coho	Pink	Chum	Salmon Roe (lbs)
1961	120,405	96,649	102,711	347,990	
1962 [a]	157,000	-	10,569	221,645	
1963 [a]	89,700	51,750	-	-	
1964 [a]	39,169	686	-	249,890	
1965	33,327	14,210	660	264,924	[b]
1966	35,259	40,285	38,334	577,764	16,901
1967	41,854	15,944	100,913	289,473	21,429
1968 [c]	22,954	50,665	250,044	306,871	20,381
1969 [d]	51,441	50,461	312,836	529,235	5,578
1970	38,103	25,000	156,313	610,588	1,345
1971	43,112	22,078	15,377	857,014	1,122
1972	57,675	3,257	133,389	710,853	1,083
1973	38,935	63,812	185,799	845,596	[b]
1974	54,433	15,023	511,737	1,082,575	39,876
1975	25,964	32,345	87,586	1,318,111	46,470
1976	34,095	49,822	271,867	669,728	[b]
1977	102,341	28,044	162,457	1,415,981	[b]
1978	222,974	50,872	1,164,174	1,389,806	[b]
1979	231,988	251,129	598,785	1,001,548	[b]
1980	135,646	204,498	719,368	1,301,693	[b]
1981	164,182	212,065	719,102	1,284,193	[b]
1982	97,255	648,212	659,171	1,338,788	95
1983	179,666	360,264	274,568	2,352,104	239
1984	169,104	523,310	343,685	1,020,635	0
1985	419,331	169,413	11,458	939,885	0
1986	133,161	247,333	133,319	1,011,824	0
1987	141,494	177,569	6,691	731,597	0
1988	67,148	280,658	226,966	767,168	0
1989	104,829	336,652	439	297,156	0
1990	168,745	426,902	-	482,060	75
1991	107,541	469,495	-	597,272	221
1992	57,571	820,406	18,230	595,345	2,641
1993	151,504	287,702	406,820	347,072	2,608
1994	98,492	102,140	2,185,066	122,540	0
1995	174,771	356,190	198,121	290,445	0
1996	95,794	573,372	1,196,115	84,349	0
1997	225,136	235,517	50	253,006	880
1998	127,831	232,705	1,330,624	106,687	0

[a] Does not include canned salmon cases (48#)
1962: 29 chinook, 883 coho, 927 pink, 12459 chum
1963: 604 chinook, 808 coho, 1,918 pink, 13,308 chum
1964: 75 chinook, 452 pink, 9,357 chum

[b] Information not available.

[c] Includes about 48,000 lbs of salted coho, about 150,000 lbs. of salted pink, and 150,000 lbs of salted chum.

[d] Includes about 598 lbs. of salted chinook, about 48,092 lbs. of salted pink and about 117,664 lbs. salted chum.

Appendix 7 Comparative salmon escapement indeces of Norton Sound streams, 1961-1998[a].

	Sinuk River					Nome River					Flambeau River				
Year	Chinook	Chum	Pink	Pink & Chum[b]	Coho	Chinook	Chum	Pink	Pink & Chum[b]	Coho	Chinook	Chum	Pink	Pink & Chum[b]	Coho
1961															
1962															
1963															
1964															
1965															
1966															
1967															
1968															
1969															
1970															
1971						-	75	7,765	-	-					
1972						-	710	14,960	-	-					
1973						6	1,760	14,940	-	-					
1974						-	854	17,832	-	-					
1975	-	4,662	5,390	-	-	1	2,161	3,405	-	-					
1976											-	375	1,994	-	-
1977	-	5,207	1,302	-	-	5	3,046	1,726	-	-	-	1,275	10	-	-
1978	-	8,756	22,435	-	-	2	5,242	34,900	-	-	-	7,110	-	-	-
1979											-	283	291	-	-
1980	3	2,022	199,000	-	1,002	5	-	-	179,095	920	-	-	-	29,190	-
1981	-	5,579	350	-	-	15	1,195	12,565	-	-	1	12,031	2,710	-	-
1982	-	638	148,800	-	-	-	700	327,570	-	-	1	5,097	25,001	-	-
1983	48	2,150	10,770	-	96	2	198	9,170	-	365	2	1,195	200	-	-
1984	7 [h]	493 [h]	284,400 [h]	-	192	-	2,084 [h]	178,870	-	839	1	3,150 [g]	20,200 [g]	-	-
1985	4	1,910	8,860	-	33	7	1,967	2,250	-	242	1	3,215	260	-	-
1986	4	1,960	28,690	-	-	2	1,150	13,580	-	-	2	3,075	300	-	-
1987	5	4,540	30	-	230	3	1,646	1,400 [h]	-	419	0	115	0	-	-
1988	3	2,070	4,652 [i]	-	563	3	973	2,490 [i]	-	1,280 [h]	3	765	10	-	-
1989	-	1,025	26,850	-	75	2	72	1,365	-	375	-	-	-	-	-
1990	-	95	29,040	-	161	-	541	13,085	-	617	-	-	-	-	-
1991	3	5,420	14,680	-	701	9	3,520	4,690	-	611	2	1,564	570	-	-
1992	-	470	292,400	-	422	3	813	255,700	-	691	-	606	180	-	-
1993	7	1,570	5,120	-	104	8	1,520	8,941	-	276 [d]	-	1,590	-	-	-
1994	10	1,140	492,000	-	307	2	350	265,450	-	631 [d]	1	4,960	290	-	-
1995	-	3,110	1,250	-	290	-	1,855	182	-	517	-	6,455	350	-	68
1996	5	1,815	74,100	-	367	-	799	34,520	-	723	-	5,390	-	-	-
1997	-	2,975	1,200	-	57	4	956	65	-	544	1	627	-	-	96
1998	-	630	372,850	-	322	3	335	179,680	-	515	1	2,828	7180	-	-

[a] Represents "high count" for season.

[b] Surveyor unable to distinguish between the two species.

[c] Poor survey conditions or partial survey, poor counting tower condition.

[d] Total counts obtained from counting tower.

[e] Combined tower and aerial survey counts below the tower.

[f] Aerial survey; not tower count.

[g] Helicopter survey.

[h] Boat survey.

[i] Foot survey.

[j] Includes counts from Casadepaga and Ophir Creeks.

[k] Includes counts from Ophir Creek.

[l] Numerous pink salmon made enumerating of chum salmon difficult; pink count may include some chum.

Appendix Table A13. Comparative salmon escapement indeces of Norton Sound streams, 1961-1998[a]. (Page 2 of 4)

	Eldorado					Fish River					Boston Creek				
Year	Chinook	Chum	Pink	Pink & Chum[b]	Coho	Chinook	Chum	Pink	Pink & Chum[b]	Coho	Chinook	Chum	Pink	Pink & Chum[b]	Coho
1961						1	-	-	14,100	-					
1962						48	-	-	28,918	-					
1963						21	-	-	25,728	-	67	1,669	-	-	-
1964						-	18,670	10,935	14,550	-	10	3,315	-	-	-
1965															
1966						7	-	-	17,955	-	153	761	-	-	-
1967						20	-	-	13,610	-					
1968						10	-	-	164,000	-	7	2,500	2,500	-	-
1969						-	2,080	124,000	-	-	100	7,000	16,000	-	-
1970						33	76,550	198,000	-	-	246	8,200	12,900	-	-
1971						1	13,185	1,670	-	-	42	7,045	80	-	-
1972						-	3,616	13,050	-	-	57	4,252	3,950	-	-
1973						31	6,887	15,564	-	-	153	3,014	3,213	-	-
1974	13	2,143	6,185	-	-	7	10,945	15,690	-	-	231	2,426	749	-	-
1975						26	20,114	15,840	-	-	147	1,885	2,556	-	-
1976						1	8,390	15,850	8,550	-					
1977	-	1,835	125	-	-	9	9,664	2,430	-	-	76	1,325	385	-	-
1978	-	10,125	12,800	-	-	29	26,797	140,640	-	-	136	2,655	74,221	-	-
1979						11	6,893	9,132	-	-	58	882	271	-	-
1980	6	9,900	55,520	-	-	-	19,100	33,500	-	-	16	2,450	1,510	-	-
1981	-	15,605	495	-	-	90	24,095	450	-	-					
1982	2	1,095	163,300	-	-	-	-	-	241,700	-	10	1,730	22,020	-	-
1983	11	994	270	-	100	87	20,037	300	-	-	154	704	-	-	-
1984	14[i]	4,361[g,i]	1,924,935[g,i]	-	261	42	-	-	293,245	-	35	-	-	47,850	-
1985	8	6,090	150	-	67	303	21,080	7,365	-	-	243	3,450	-	-	-
1986	9	3,490	18,200	-	-	200	25,190	140	-	-	2	220	0	-	-
1987	6	3,860	0	-	108	193	7,886	0	-	-	583	3,640	0	-	-
1988	17	2,645	1,045	-	78	36	1,240	29,950[l]	-	-	163	1,040	7,400[l]	-	-
1989	-	350	1,550	-	87						-	-	-	-	-
1990	17	884	2,050	-	44						-	1,455	8,440	-	-
1991	76	5,755	1,590	-	98	58	10,190	51,190	-	-	152	2,550	3,210	-	-
1992	-	4,887	6,615	-	113	4	390	1,387,000	-	-	68	1,540	803,200	-	-
1993	38	2,885	120	-	110	48	12,695	13,440	-	-	227	4,513	1,930	-	-
1994	2	5,140	53,890	-	242	55	16,500	910,000	-	-	95	4,270	355,600	-	-
1995	-	9,025	50	-	247	40	13,433	780	-	1,829	78	4,221	-	-	230
1996	21	23,820	40,100	-	254	189	5,840[l]	684,780	-	-	133	3,505[l]	35,980	-	-
1997	40	5,967	10	-	37	110	19,515	800	-	465	452	4,545	-	-	-
1998	8	3,000	123,950	-	71	96	28,010	663,050	-	-	255	418	175,330	-	-

[a] Represents "high count" for season.

[b] Surveyor unable to distinguish between the two species.

[c] Poor survey conditions or partial survey, poor counting tower condition.

[d] Total counts obtained from counting tower.

[e] Combined tower and aerial survey counts below the tower.

[f] Aerial survey; not tower count.

[g] Helicopter survey.

[h] Boat survey.

[i] Foot survey.

[j] Includes counts from Casadepaga and Ophir Creeks.

[k] Includes counts from Ophir Creek.

[l] Numerous pink salmon made enumerating of chum salmon difficult; pink count may include some chum.

Appendix T Comparative salmon escapement indeces of Norton Sound streams, 1961-1998[a]. (P 1)

Year	Niukluk River					Kwiniuk River					Tubutulik River				
	Chinook	Chum	Pink	Pink & Chum[b]	Coho	Chinook	Chum	Pink	Pink & Chum[b]	Coho	Chinook	Chum	Pink	Pink & Chum[b]	Coho
1961															
1962	11	-	-	27,879	-	3	-	-	23,249	-	3	-	-	16,690	-
1963	1	13,687	4,103	-	-	2	11,340	3,779	-	-	9	16,069	4,355	-	-
1964	-	8,395	10,495	-	-	-	14,533	-	-	-	-	15,469	10,043	3,420	-
1965						[d] 14	26,634	8,301	-	-					
1966	-	21,300	8,600	4,700	-	[d] 7	32,786	10,629	-	-	-	5,514	26,000	-	-
1967	-	20,546	-	-	-	[d] 13	24,444	3,508	-	-	1	-	-	22,475	-
1968	-	-	-	87,085	-	[d] 27	18,813	126,764	-	-					
1969	-	10,240	92,650	-	-	[d] 12	19,687	56,683	-	-	3	12,040	12,788	3,045	-
1970	-	7,300	60,350	-	-	[d] -	68,004	235,131	-	-	-	53,290	136,590	-	-
1971	-	22,605	8,370	-	-	[d] 37	39,046	16,742	-	-	-	16,820	7,500	5,065	-
1972[c]	-	10,500	22,600	-	-	[d] 65	30,686	62,461	-	-	[e] -	8,070	21,100	-	-
1973	-	14,365	14,790	-	-	[d] 57	28,617	38,420	-	-	131	5,383	15,665	-	-
1974	1	8,720	8,915	-	-	[d] 62	35,899	40,816	-	-	136	9,560	17,940	-	-
1975	-	10,089	16,258	-	-	[d] 44	14,344	57,317	-	-	7	17,141	38,003	-	-
1976	-	4,130	7,190	-	-	[d] 12	6,977	29,471	-	-	-	1,095	6,095	2,600	-
1977	19	10,456	4,150	-	-	[d] 84	22,757	46,234	-	-	-	8,540	4,685	-	-
1978	2	14,365	208,300	-	-	[c, d] 74	14,408	72,270	-	-	2	5,865	1,364	-	-
1979[d]	8	10,127	30,147	-	-	[d] 107	12,355	167,492	-	-	-	812	1,624	-	-
1980	-	8,915	75,770	-	-	[d] 177	19,374	320,389	-	-	[e] 405	21,616	663,937	-	-
1981	-	7,249	-	-	-	[d] 136	34,561	566,417	-	-	–	–	–		
1982	20	2,557	227,540	-	-	[d] 138	44,036	469,674	-	-	[e] 49	2,044	53,605	-	-
1983	54	8,886	50	-	-	[d] 267	56,907	251,965	-	-	135	16,345	40,790	-	-
1984[j]	6	-	-	57,208	3,072	[d] 736	54,043	736,544	-	983 [f]	139	56,210	93,600	-	-
1985	25	11,140	-	-	332 [k]	[d] 712	9,912	22,548	-	673 [f]	472	13,645	8,940	-	-
1986	2	2,442	0	-	-	[d] 653	24,704	241,446	-	421	453	5,975	35,680	-	-
1987	10	4,145	0	-	257 [k]	[d] 314	16,134	5,567	-	819 [f]	474	9,605	580	-	-
1988	18	6,501	8,160 [l]	-	1,095 [k]	[d] 321	13,301	187,904	-	444 [f]	561	4,660	114,450 [a]	-	-
1989	-	-	-	-	182	[d] 282	13,689	30,275	-		[e] -	-	-	-	-
1990	-	6,200	-	-	170	[d] 744	13,735	404,452	-	746 [f]	397	4,350	186,400	-	-
1991	24	10,660	37,410	-	1,783	[d] 587	18,802	54,591	-	809 [f]	661	7,085	26,870	-	-
1992	-	7,770	803,200	-	812	[d] 479	12,077	1,464,717	-	532 [f]	260	2,595	138,600	-	-
1993	15	19,910	2,840	-	2,104	[d] 565	15,823	43,065	-	1,238 [f]	1,061	8,740	18,650	-	1,395
1994	7	16,470	1,294,100	-	274	[d] 627	33,010	2,303,112	-	2,841 [f]	No survey due to poor conditions				
1995	48	25,358	200	-	2,136	[d] 468	42,161	17,573	-	1,625 [f]	377	16,158	4,020	-	930
1996	25	9,732 [l]	153150	-	2,047	[d] 567	27,256	937,735	-	1,410 [f]	439	10,790	226,750	-	-
1997	131	16,550	-		983	[d] 972	20,118	9,536	-	610 [f]	1,946	3,105	16,890	-	-
1998	51	2,556	205,110		593	[d] 296	24,248	655,933	-	610 [f]	894	10,180	112,480	-	-

[a] Represents "high count" for season.

[b] Surveyor unable to distinguish between the two species.

[c] Poor survey conditions or partial survey, poor counting tower condition.

[d] Total counts obtained from counting tower.

[e] Combined tower and aerial survey counts below the tower.

[f] Aerial survey; not tower count.

[g] Helicopter survey.

[h] Boat survey.

[i] Foot survey.

[j] Includes counts from Casadepaga and Ophir Creeks.

[k] Includes counts from Ophir Creek.

[l] Numerous pink salmon made enumerating of chum salmon difficult; pink count may include some chum.

Appendix Table A13. Comparative salmon escapement indeces of Norton Sound streams, 1961-1998[a].

	North River				
Year	Chinook	Chum	Pink	Pink & Chum[b]	Coho
1961					
1962	162	-	-	16,087	-
1963[c]	287	-	-	73,274	-
1964	23	-	-	5,981	-
1965	153	-	-	16,600	-
1966					
1967					
1968					
1969					
1970[c]	1	20,655	12,400	-	-
1971[c]	256	-	-	1,047	-
1972[d]	561	2,332	54,934	-	-
1973[d]	298	4,332	26,542	-	-
1974[d]	220	861	154,285	-	-
1975[c]	60	5,237	17,885	-	-
1976[c]	66	196	10,606	-	-
1977	1,275	8,139	4,565	-	-
1978	321	9,349	21,813	-	-
1979	735	1,130	9,500	-	-
1980	61	2,300	127,900	-	204
1981	68	405	575	-	263
1982	8	599	173,352	-	4,145
1983	347	4,135	4,980	-	-
1984[d]	2,844	2,915	458,387	-	152[f]
1985[d]	1,426	4,567	4,360	-	2,045
1986[d]	1,613	3,738	236,487	-	-
1987	445	392	0	-	680
1988	202	30	112,770[l]	-	240
1989[c]	-	-	-	-	-
1990	255	510	25,685	-	-
1991	656	2,435	118,720	-	2,510
1992	329	-	631,140	-	398
1993	900	445	13,570	-	1,397
1994	No survey due to poor conditions				
1995	622	1,370	18,300	-	690[e]
1996	106	220[i]	125,500	-	917
1997	1,605	9,045	17,870	-	-
1998	591	50	153,150	-	233

[a] Represents "high count" for season.

[b] Surveyor unable to distinguish between the two species.

[c] Poor survey conditions or partial survey, poor counting tower condition.

[d] Total counts obtained from counting tower.

[e] Combined tower and aerial survey counts below the tower.

[f] Aerial survey; not tower count.

[g] Helicopter survey.

[h] Boat survey.

[i] Foot survey.

[j] Includes counts from Casadepaga and Ophir Creeks.

[k] Includes counts from Ophir Creek.

[l] Numerous pink salmon made enumerating of chum salmon difficult; pink count may include some chum.

Appendix Table B1. Subsistence surveys conducted in Port Clarence District 1963 - 1998.

Year		Number of Fishing Families Interviewed	Chinook	Sockeye	Coho	Pink	Chum	Total
1963		19	9	4,866	25	1,061	1,279	7,240
1964		22	17	1,475	227	371	1,049	3,139
1965		29	36	1,804	639	1,854	1,602	5,935
1966		26	10	1,000	896	859	2,875	5,640
1967		19	12	2,068	232	767	1,073	4,152
1968		24	40	688	133	1,906	904	3,671
1969		13	2	180	27	548	932	1,689
1970		18	4	588	1,071	1,308	4,231	7,202
1971		22	31	850	959	1,171	3,769	6,780
1972		8	4	68	388	75	2,806	3,341
1973		4	22	46	280	424	1,562	2,334
1974		13	-	28	62	14	2,663	2,767
1975		17	-	244	5	743	1,589	2,581
1976		15	7	291	20	436	6,026	6,780
1977	[a]	13	-	-	-	-	-	5,910
1978		26	1	392	-	7,783	705	8,881
1979		26	-	320	35	741	1,658	2,754
1980		22	7	3,195	5	3,170	1,715	8,092
1981		10	8	255	110	765	5,845	6,983
1982		27	23	405	100	4,345	684	5,557
1983	[b]	3	17	261	-	615	299	1,192
1984 - 1988	[c]							
1989	[d]	15	28	535	472	395	410	1,840
1990 - 1993	[c]							
1994	[e]	127	181	1,979	1,692	3,849	2,042	9,743
1995	[e]	122	76	4,481	1,739	3,293	6,011	15,600
1996	[e]	117	195	4,558	2,079	2,587	1,264	10,684
1997	[e]	126	158	3,177	829	755	2,099	7,019
1998	[e]	138	287	1,665	1,759	7,812	2,621	14,144

[a] Species composition estimated at 75% chum, 10% pink, 10% sockeye and 5% chinook and coho c

[b] Data collected from returned catch calandars. Due to low return of calendars and absence of house surveys, the resultant catches are incomplete and not comparable to past years.

[c] Surveys not conducted.

[d] Survey conducted by Subsistence Division and contacted 15 of 43 households in Brevig Mission.

[e] Harvest estimate from Div. of Subsistence survey.

Appendix Table B2. Comparative sockeye salmon aerial survey indicies, Port Clarence District, 1963 -1998.

Year	Salmon Lake	Grand Central River	Total
1963	866	620	1,486
1964 [c]	76	590	666
1965	250	160	410
1966	1,120	370	1,490
1967	129	280	409
1968 [c]	830	645	1,475
1969	24	171	195
1970 [a]	-	-	-
1971	538	512	1,050
1972 [c]	680	300 [b]	980
1973	1,747	607	2,354
1974	820	-	820
1975	537	123	660
1976	132	22	154
1977	317	235	552
1978	822	280	1,102
1979	1,250	261	1,511
1980 [c]	512	175	687
1983	970	-	970
1984	445	30	475
1985	730	250	980
1986	2,125	160	2,285
1987	4,040	530	4,570
1988	1,195	6	1,201
1989	3,055	525	3,591
1990	2,834	926	3,760
1991	3,790	1,570	5,360
1992	1,500	[a]	1,500
1993	2,885	216	3,092
1994	3,740	1,230	4,970
1995	5,433	628 [d]	6,061
1996	6,610	770	7,380
1997	8,760	1,520	10,280
1998	5,210	1,977	7,187

[a] No survey made.

[b] Boat survey.

[c] Poor survey.

[d] Early count

Appendix Table C1. Kotzebue District Chum Salmon commercial catch Statistics, 1962-1998.

Year	Total Catch	Total Days [a]	Boat Days [b]	Catch/Boat Day	Number Fisherman [c]	Season Catch per Fisherman
1962	129,948	21.0	793	164	84	1,547
1963	54,445	20.0	693	79	61	893
1964	76,449	27.0	560	137	52	1,470
1965	40,025	32.0	410	98	45	889
1966	30,764	35.0	548	56	44	699
1967	29,400	33.0	556	53	30	980
1968	30,212	34.0	858	35	59	512
1969	59,335	40.0	798	74	52	1,141
1970	159,664	32.0	1,368	117	82	1,947
1971	154,956	29.0	1,468	106	91	1,703
1972	169,664	35.0	2,095	81	104	1,631
1973	375,432	25.0	2,217	169	148	2,537
1974 [d]	627,912	32.0	3,769	167	185	3,394
1975 [e]	552,641	39.0	4,301	128	267	2,070
1976	159,796	16.0	2,236	71	220	726
1977	195,895	21.0	2,353	83	224	875
1978	111,494	23.0	2,738	41	208	536
1979	141,623	21.0	2,462	58	181	782
1980	367,284	27.0	2,559	144	176	2,087
1981	677,239	27.0	3,336	203	187	3,622
1982	417,790	23.5	3,115	134	199	2,099
1983	175,762	12.5	1,557	113	189	930
1984	320,206	19.5	2,432	132	181	1,769
1985	521,406	25.5	3,376	154	189	2,759
1986	261,436	15.5	2,049	128	187	1,398
1987	109,467	11.5	1,160	94	160	684
1988	352,915	21.5	2,761	128	193	1,829
1989	254,617	22.2	1,961	130	165	1,543
1990	163,263	11.5	1,760	93	153	1,067
1991	239,923	22.5	1,795	134	142	1,690
1992	289,184	17.0	1,513	191	149	1,941
1993 [f]	73,071	7.0	431	170	114	641
1994 [g]	153,452	9.8	426	360	109	1,408
1995	290,730	9.7	282	1031	92	3,160
1996 [h]	82,110	6.0	76	1080	55	1,493
1997	142,720	16.5	330	432	68	2,099
Average	222,006	22.8	1,698	182	135	1,571
1998	55,907	13.0	186.5	300	45	1,242

a Day = 24 hours of open fishing time.

b Boat days standardized in 1983 for all prior years. Boat days = number of boats fishing times period length in hours divided by 24. Total boat days = total season boat hours divided by 24.

c During 1962-1966 and 1968-1971 figures represent the number of vessels licensed to fish in the Kotzebue District, not the number of fishermen.

d Does not include 6,567 chum salmon frpm the Deering experimental fishery.

e Does not include 10,704 chum salmon from the Deering experimental fishery.

f Includes 2,000 chum salmon from the Sikusuilaq springs Hatchery terminal fishery.

g Includes 4,000 chum salmon commercially caught but not sold on July 29.

h Includes 2,200 chum salmon commercially caught but not sold on July 29.

Appendix Table C2. Kotzebue District chum salmon type of processing and weights, 1962-1998.

Year	Chum Salmon Cases (48lbs)	Chum Salmon Fresh Frozen (Round weight in pounds)	Other [a]	Fresh Frozen Salmon Roe (pounds)	Cured Pounds
1962	14,500				
1963	5,396				
1964	5,421	202,993			
1965	1,929	207,350			
1966		310,716		13,600	3,065
1967		273,420			11,488
1968		288,500			11,850
1969		455,013			8,183
1970		1,240,000			48,377
1971		1,264,753			27,542
1972		1,547,041			55,376
1973		3,416,431			144,768
1974		5,361,130 [b]			
1975		4,877,313 [c]			
1976		1,415,549	487		
1977		1,846,340	1,075		
1978		1,009,121	32,419		
1979		1,236,429	6,155		
1980		3,160,948	7,828		
1981		6,139,518	2,210		
1982		3,833,051	790	100	
1983		1,647,160	2,449		
1984		2,631,582	1,593		
1985		4,528,379	1,106		
1986		2,271,320	1,691		
1987		900,405	597		
1988		3,060,292	2,120		
1989		2,163,174	1,426		
1990		1,453,040	538		
1991		1,951,041	714		
1992		2,397,302	2,714		
1993 [d]		613,968	1,507	1,000	
1994 [e]		1,166,494	73		
1995		2,329,898	93		
1996 [f]		97,510	51		
1997		1,141,741	649		
1998		447,256	2,971		

[a] Chinook and pink salmon.

[b] Includes 36,775 pounds from the experimental commercial fishery at Deering.

[c] Includes 80,801 pounds from the experimental commercial fishery at Deering.

[d] Includes 11,160 pounds from the Sikusuilaq Springs Hatchery terminal fishery. Pounds of roe stripped are from a verbal report.

[e] Includes 31,500 pounds commercially caught but not reported on fish tickets.

[f] Includes 17,600 pounds commercially caught but not sold on fish tickets.

Appendix Table C3. Kotzebue District commercial salmon fishery dollar value estimates, 1962-1998. [a]

Year	Gross Value of Catch to Fishermen	Wholesale Value of Pack [b]	License and Tax Revenue to State
1962	$4,500	$304,500	$11,635
1963	$9,140	$113,316	$6,040
1964	$34,660	$158,020	$5,279
1965	$18,000	$83,294	$2,952
1966	$25,000	$84,630	$2,820
1967	$28,700	$100,450	$4,245
1968	$46,000	$62,000	$2,800
1969	$71,000	[f]	
1970	$186,000	[f]	$5,520
1971 [c]	$200,000	[f]	$5,970
1972 [d]	$260,000	[f]	
1973	$925,000	[f]	
1974	$1,822,784	[f]	$18,121
1975	$1,365,648	[f]	$16,955
1976	$580,375	[f]	$15,364
1977	$1,033,950	[f]	$19,960
1978	$575,260	[f]	$9,913 [e]
1979	$990,263	[f]	$18,302 [e]
1980	$1,446,633	[f]	$11,820 [e]
1981	$3,246,793	[f]	$11,220 [e]
1982	$1,961,518	[f]	$7,085 [e]
1983	$420,736	[f]	$24,097 [e]
1984	$1,148,884	[f]	$39,696 [e]
1985	$2,137,368	[f]	$6,720 [g]
1986	$931,241	[f]	$6,840 [g]
1987	$515,000	[f]	$6,930 [g]
1988	$2,581,333	[f]	$11,490 [g]
1989	$613,823	[f]	$11,250 [g]
1990	$438,044	[f]	$11,370 [g]
1991	$437,948	[f]	$10,920 [g]
1992	$533,731	[f]	$10,565 [g]
1993 [h]	$235,061	[f]	$10,645 [g]
1994	$233,512	[f]	$10,520 [g]
1995	$316,031	[f]	$10,315 [g]
1996	$56,310	[f]	$10,565 [g]
1997	$187,978	[f]	$11,050 [g]
1998	$70,578	[f]	$10,150 [g]

[a] Some estimates between 1962 and 1981 include only chum value which in figures represent over 99% of the total value. Figures after 1981 represent the chum value as well as incidental species such as char, whitefish and other salmon.

[b] Based on type of processing when fish were shipped out of the district.

[c] Includes $9,193 from the experimental commercial fishery at Deering.

[d] Includes $17,776 from the experimental commercial fishery at Deering.

[e] Includes permit and vessel fees only.

[f] Information not available.

[g] Includes permit renewal fees only; vessels were not required.

[h] Includes $3,648 from the Sikusuilaq Springs Hatchery terminal fishery.

Appendix Table C4. Kotzebue District mean prices paid per pound to salmon fishermen by species, 1962-1998 [a]

Year	Chum Salmon Average Weight	Chum Salmon Average Price	Chinook Salmon	Pink Salmon	Inconnu	Dolly Varden
1962		$0.35 [c]				
1963		$0.35 [c]				
1964	8.3	$0.45 [c]				
1965	9.0	$0.45			$1.30 [c]	
1966	10.1	$0.11			$1.40 [c]	$0.55
1967	9.3	$0.11			$1.50 [c]	$0.75
1968	9.7	$0.14			$0.91 [c]	$0.98
1969	7.5	$0.15			$1.30 [c]	$2.84
1970	8.1	$0.15				
1971	8.1	$0.16			$0.16	$0.17
1972	9.1	$0.17			$0.20	$0.17
1973	9.1	$0.25			$0.30	$0.16
1974 [b]	8.5	$0.34			$0.30	$0.16
1975 [b]	8.6	$0.28			$0.30	$0.30
1976	8.9	$0.41			$0.30	$0.30
1977	9.6	$0.56			$0.30	
1978	9.1	$0.57			$0.30	$0.25
1979	8.8	$0.80				$0.25
1980	8.6	$0.46			$0.10	$0.20
1981	9.1	$0.53			$0.75	$0.17
1982	9.3	$0.51	$1.25	$0.15	$0.75	$0.20
1983	9.4	$0.25	$1.08	$0.13		$0.20
1984	8.2	$0.44	$1.03			$0.25
1985	8.7	$0.47	$1.25			$0.25
1986	8.7	$0.41	$1.25			$0.20
1987	8.2	$0.57	$1.25			$0.30
1988	8.7	$0.85	$1.98			$0.35
1989	8.5	$0.28	$1.72			$0.28
1990	8.9	$0.31	$2.00			$0.25
1991	8.1	$0.22	$1.64		$0.50	$0.18
1992	8.3	$0.22	$1.89		$0.58	$0.10
1993	8.5	$0.38	$2.37		$0.50	$0.10
1994	7.8	$0.20	$1.14			$0.17
1995	8.0	$0.13	$1.00		$0.50	$0.20
1996	8.0	$0.09	$1.00		$0.44	$0.25
1997	8.0	$0.16	$1.02			$0.20
1998	8.0	$0.15	$1.00			$0.20

[a] Information not available for some species in some years.

[b] Includes price paid to fisherment of Deering during the experimental commercial fishery.

[c] Price per fish.

Appendix Table C5. Kotzebue District commercial and subsistence salmon catches, 1914-1998.

	Commercial Catch			Subsistence Chum Catch			
Year [a]	Chum [b]	Other [c]	Total	Chum	Number of Fishermen Interveiw	Average Catch per Fishermen	Total Documented Catch
1914	8,550		8,550				
1915	4,750		4,750				
1916	19,000		19,000				
1917	44,612		44,612				
1918	27,407		27,407				
1957				298,430 [d]			
1962	129,948	27	129,975	70,283	81	868	200,258
1963	54,445	143	54,588	31,069	67	464	85,657
1964	76,499	5	76,504	29,762	58	513	106,266
1965	40,034		40,034	30,500	89	343	70,534
1966	30,764	1	30,765	35,588	121	294	66,353
1967	29,400		29,400	40,108	135	297	69,508
1968	30,384 [e]		30,384	20,814	65	320	51,198
1969	59,335	48	59,383	29,812	99	301	89,195
1970	159,664		159,664	28,486	164	174	188,150
1971	154,956	1	154,957	23,959	152	158	178,916
1972	169,664	3	169,667	11,085	96	115	180,752
1973	375,432	5	375,437	18,942	101	188	394,379
1974	634,479 [f]	48	634,527	26,729	88	304	661,256
1975	563,682 [g]	36	563,718	27,605	95	291	591,323
1976	159,796	2	159,798	15,765	91	173	175,563
1977	195,895		195,895	9,752	83	117	205,647
1978	111,494	7,007	118,501	12,864	85	151	131,365
1979	141,623	910	142,533	14,605	97	151	157,138
1980	367,284	1,654	368,938	10,945	111	99	379,883
1981	677,239	237	677,476	17,766	71	250	695,242
1982	417,790	57	417,847	30,133	204	148	447,980
1983	175,762	229	175,991	8,262 [h]	46	180	184,253
1984	320,206	107	320,313	15,508 [h]	66	235	335,821
1985	521,406	63	521,469	13,494 [i]	243	56	534,963
1986	261,436	106	261,542	36,311	837	43	297,853
1987	109,467	44	109,511	[j]	[j]	[j]	109,511
1988	352,915	152	353,067	[j]	[j]	[j]	353,067
1989	254,617	87	254,704	[j]	[j]	[j]	254,704
1990	163,263	32	163,295	[j]	[j]	[j]	163,295
1991	239,923	44	239,967	[j]	[j]	[j]	239,967
1992	289,184	204	289,388	[j]	[j]	[j]	289,388
1993	73,071 [k]	131	73,202	[j]	[j]	[j]	73,202
1994	153,452 [l]	3	153,455	36,226 [n]	375	97	189,681
1995	290,730	5	290,735	102,880	593	173	393,615
1996	82,110 [m]	3	82,113	99,740	596	167	181,853
1997	142,720	45	142,765	57,906	530	109	200,671
1998	55,907	210	56,117	48,979	592	83	105,096
1979-98 Average	254,505	216	254,721	1994-98 Average 69,146	537	126	

[a] There was no commercial fishing during 1919-1961.

[b] Catches for 1914-1918 are from pack data only. Number of chum salmon estimate at 9.5 per case (#48) and 34 per barrel.

[c] Includes pink, chinook, and sockeye salmon.

[d] Estimated mean annual catches prior to 1957 (study by Raleigh).

[e] Corrected from 1968 annual report due to addition of late catches.

[f] Includes 6,567 chum salmon from the Deering experimental fishery.

[g] Includes 10,704 chum salmon from the Deering experimental fishery.

[h] Partial survey.

[i] Does not include harvest from the villages of Noatak and Kivalina.

[j] Not surveyed.

[k] Includes 2,000 chum salmon from the Sikusuilaq Springs Hatchery terminal fishery.

[l] Includes 4,000 chum salmon commercially harvested on August 5 but not sold.

[m] Includes 2,200 chum salmon commercially harvested on July 29 but not sold.

[n] Does not include the town of Kotzebue.

Appendix Table C6. Kotzebue District subsistence chum salmon catches by village, 1962-1998.

	Village							Village						
Year	Noorvik	Kiana	Ambler	Shungnak	Kobuk River	Kobuk Villages	Noatak Village	Kotzebue	Deering	Kivalina	Buckland	Candle	Shishmaref	District Total
1962	15,934	3,139	[b]	[b]	2,321	21,394	48,890	[b]	[b]	[b]	[b]	[b]	[b]	70,284
1963	4,304	1,973	755	1,240	200	8,472	16,762	5,835	[b]	[b]	[b]	[b]	[b]	31,069
1964	2,167	783	2,142	3,134	1,020	9,246	12,763	7,753	[b]	[b]	[b]	[b]	[b]	29,762
1965	5,596	1,598	1,340	2,160	877	11,571	5,671	8,058	5,200	[b]	[b]	[b]	[b]	30,500
1966	3,141	433	912	899	625	6,010	19,700	3,640	6,238	[b]	[b]	[b]	[b]	35,588
1967	2,350	1,489	679	1,500	175	6,193	26,512	4,032	3,098	[b]	162	11	100	40,108
1968	2,424	2,488	457	1,600	1,030	7,999	5,490	4,324	2,838	[b]	37	89	37	20,814
1969	1,301	2,458	3,525	2,550	1,655	11,489	14,458	1,768	1,897	[b]	-	200	-	29,812
1970	6,077	3,457	2,899	3,450	600	16,483	4,120	6,814	1,242	[b]	344	113	-	29,116
1971	7,144	5,177	2,299	2,653	1,931	19,204	9,919	1,737	763	[b]	155	50	131	31,959
1972	1,744	1,435	1,469	2,665	2,119	9,432	741	1,151	369	[b]	59	113	29	11,894
1973	2,312	4,470	1,529	4,406	1,917	14,634	216	1,172	1,098	[b]	1,722	50	100	18,992
1974	6,809	2,726	1,651	6,243	2,251	19,680	4,330	[b]	1,880	[b]	639	15	200	26,744
1975	4,620	4,320	3,390	9,060	1,755	23,145	1,515	[b]	1,175	[b]	1,540	[b]	230	27,605
1976	1,555	1,579	2,000	4,213	562	9,909	4,448	[b]	1,358	[b]	[b]	[b]	[b]	15,715
1977	891	766	385	1,760	325	4,127	2,125	[b]	3,500	[b]	[b]	[b]	[b]	9,752
1978	2,034	1,493	2,224	4,766	852	11,369	1,495	[b]	[b]	[b]	[b]	50	[b]	12,914
1979	2,155	1,225	2,400	2,947	651	9,378	2,227	[b]	2,000	[b]	1,000	[b]	[b]	14,605
1980	2,229	2,551	660	2,704	350	8,494	2,135	[b]	[b]	[b]	[b]	[b]	[b]	10,629
1981	3,488	1,439	782	2,800	950	9,459	5,465	2,387	295	110	50	[b]	[b]	17,766 [a,c]
1982	7,433	4,918	2,506	4,191	600	19,648	5,479	4,099	807	210	[b]	[b]	[b]	30,243 [a]
1983 [a,d]	277	223	1,062	3,556	368	5,486	4,035	347	219	200	[b]	[b]	[b]	10,287
1984 [a,e]	[b]	[b]	2,990	4,241	[b]	7,231	6,049	88 [a]	1,940	200	[b]	[b]	[b]	15,508
1985	7,015	3,494	3,487	3,115	300	17,411	[b]	13,494	573	[b]	[b]	[b]	[b]	31,478
1986	8,418	[b]	[b]	4,483	[b]	12,901	1,246	36,311	[b]	[b]	[b]	[b]	[b]	50,458
1987	5,092	[b]	[b]	1,975	[b]	7,067	2,921	[b]	[b]	[b]	[b]	[b]	[b]	9,988
1988	7,500	[b]	[b]	6,223	[b]	13,723	[b]	[b]	[b]	[b]	[b]	[b]	[b]	13,723
1989	[b]	[b]	[b]	3,894	[b]	3,894	1,595	[b]	[b]	[b]	[b]	[b]	[b]	5,489
1990	4,353	[b]	[b]	[b]	[b]	4,353	3,915	[b]	[b]	[b]	[b]	[b]	[b]	8,268
1991	6,855	[b]	[b]	4,248	[b]	11,103	3,637	[b]	[b]	[b]	[b]	[b]	[b]	14,740
1992	8,370	[b]	[b]	3,890	[b]	12,260	2,043	[b]	[b]	[b]	[b]	[b]	[b]	14,303
1993	8,430	[b]	[b]	3,730	[b]	12,160	3,270	[b]	[b]	[b]	[b]	[b]	[b]	15,430
1994	8,157	1,891	2,860	7,982	5,722	26,612	6,126	[b]	3,488	[b]	[b]	[b]	[b]	36,226
1995	15,485	5,985	8,558	5,880	2,959	38,867	6,359	50,708	[b]	[b]	[b]	[b]	6,947	102,881
1996	13,611	5,935	9,062	8,649	1,819	39,076	10,091	50,573	[b]	[b]	[b]	[b]	[b]	99,740
1997	14,323	3,064	2,713	5,513	629	26,242	5,309	26,355	[b]	[b]	[b]	[b]	[b]	57,906
1998	9,845	3,414	2,432	4,676	1,031	21,398	2,614	24,968	[b]	[b]	[b]	[b]	[b]	48,980

[a] No household survey, information is from return of mail questionaires.

[b] Not surveyed.

[c] Does not include 310 chum salmon taken in Selawik.

[d] Household [illegible] were conducted in Noatak, Kivalina, and Shungnak only. Other harvest information is from limited [illegible] of mail-in calendars.

[e] Household [illegible] were conducted in Noatak, Kivalina, Ambler, and Deering. Other harvest information is from limi[illegible] of mail-in questionaires.

Appendix Table C7. Kotzebue District mean subsistence chum salmon catch per fisherman by village, 1962-1998.

Year	Kotzebue	Noatak	Noorvik	Kiana	Ambler	Shungnak	Kobuk	Deering
1962	[a]	1190	665	350	[a]	[a]	335	[a]
1963	650	800	160	[b]	94	[b]	67	[a]
1964	515	710	220	260	310	[a]	205	[a]
1965	400	810	220	265	190	220	145	[a]
1966	158	820	137	62	76	45	104	[a]
1967	202	914	90	68	49	125	35	[a]
1968	135	220	84	96	33	114	206	[a]
1969	98	760	163	223	235	318	206	[a]
1970	187	242	132	138	242	182	150	[a]
1971	53	148	223	207	177	133	386	[a]
1972	63	74	84	84	244	266	302	[a]
1973	195	36	121	178	305	489	273	[a]
1974	[a]	393	324	181	165	891	450	[a]
1975	[a]	138	210	288	282	647	293	[a]
1976	[a]	212	259	79	250	281	70	[a]
1977	[a]	425	56	38	55	104	41	[a]
1978	[a]	79	88	71	131	265	142	[a]
1979	[a]	114	98	68	160	184	108	[a]
1980	[a]	164	318	213	132	246	88	[a]
1981	213	579	388	131	129	233	317	[a]
1982	84	189	323	246	167	262	200	81
1983 [c]	50	269	139	223	531	254	368	44
1984	44	173	[a]	[a]	214	303	[a]	194
1985	107	[a]	206	116	152	195	50	72
1986	47	69 [d]	271	[a]	[a]	195	[a]	[a]
1987	[a]	225 [d]	189	[a]	[a]	329	[a]	[a]
1988	[a]	[a]	300	[a]	[a]	389	[a]	[a]
1989	[a]	133	[a]	[a]	[a]	216	[a]	[a]
1990	[a]	135	198	[a]	[a]	[a]	[a]	[a]
1991	[a]	145	311	[a]	[a]	283	[a]	[a]
1992	[a]	89	310	[a]	[a]	243	[a]	[a]
1993	[a]	136	312	[a]	[a]	196	[a]	[a]
1994 [e]	[a]	90	133	32	99	154	260	92
1995	71	69	123	59	110	111	110	[a]
1996	73	115	117	58	111	154	76	[a]
1997	41	71	125	35	39	117	28	[a]
1998	35	27	79	34	30	84	41	[a]

[a] Not Surveyed.

[b] Number of fishermen not known.

Means based on very limited number of mail-in calendars except for the villages of Noatak and Shungnak where interveiws were conducted.

[d] Partial harvest, fishermen were just beginning to fish.

[e] Preliminary information based on interviews conducted by Division of Subsistence.

Appendix Table C8. Chum salmon aerial survey counts for the Kotzebue District, 1962-1998 [a,h]. (p. 1 of 4)

Stream	1962	1963	1964	1965	1966	1967	1968	1969	1970
Noatak Drainage									
Noatak River below Kelly River	168,000 [d]	1,970 [b,j]	89,798	6,152 [b,j]	101,640	29,120 [b]	39,394	33,945	
Eli River	9,080 [d]	35			120		5,502 [f]	68 [f]	138,145
Kelly River & Lake	1,818 [d]	600		3,155	570	225	375	150	
Noatak River System Total	178,898	2,605	89,798	9,307	102,330	29,345	45,271	34,163	
Kobuk Drainage									
Kobuk to Pah River		400		1,750	266		530		
Pah River to just below Selby River		1,530		500			50		1,753
Selby River mouth & Slough		1,045		500	630	1,625	70		20
Selby R. mouth to Beaver C.		1,095				75	170		4,820
Beaver Creek mouth					460	795	1,550		2,385
Above Beaver Creek		465			118				4,930
Upper Kobuk River Total	9,224 [d]	4,535	7,985 [g]	2,750	1,474	2,495	2,370	7,500 [c]	
									13,908
Squirrel River	5,834 [d]	2,200	8,009	7,230	1,350	3,332	6,746	6,714	
Salmon River	12,936 [d]	1,535	9,353	1,500 [b]	3,957	2,116	3,367	2,561	4,418
Tutuksuk River	10,841 [d]	670	2,685		1,383	169	823 [b]	159	3,000 [b]
									2,000 [b]
Kobuk River System Total	38,835 [c]	8,940	28,032	11,480	8,164	8,112 [c]	13,306	16,934	

(continued)

Stream	1971	1972 [b]	1973 [b]	1974	1975	1976	1977 [b]	1978	1979	1980
Noatak Drainage										
Noatak River below Kelly River	41,056	64,315	32,144	129,640	96,509	44,574	11,221	37,817	15,721 [b]	164,474
Eli River		3,286		22,249	1,302	1,205	742	5,525	1,794	10,277
Kelly River & Lake			2,590 [f]	1,381 [f]	3,937	217 [b]	290 [b]	168 [b]	3,200 [b]	7,416
Noatak River System Total	41,056	64,315 [b]	34,734	153,270	101,748	45,996	12,253 [b]	43,510	20,715	182,167
Kobuk Drainage										
Kobuk to Pah River	4,953			2,255	1,873	485		269	75	1,694
Pah River to just below Selby River	2,039	1,865		4,710	3,968	2,037		1,448	183	2,069
Selby River mouth & slough	3,490	7,400		7,380				211	1,110	
Selby R. mouth to Beaver C.	4,720	3,170	920	13,775 [e]	4,861 [e]			53	640	6,925 [d]
Beaver Creek mouth	2,000	3,000	850							784
Above Beaver Creek		2,720	700							
Upper Kobuk River Total	17,202	18,155	2,470 [b]	28,120	10,702	2,522 [b]		1,981 [b]	2,008	11,472
Squirrel River	6,628	32,126	12,345	32,523	32,256	7,229	1,964 [b]	1,863 [b]	1,500 [b]	13,563
Salmon River	5,453	2,073 [b]	6,891	29,190	9,721	1,161		814 [b]	674 [b]	8,456
Tutuksuk River	1,384 [f]			8,312	1,344 [b]	758		368 [b]	382 [b]	1,165
Kobuk River System Total	30,667	52,354	21,706	98,145	54,023	11,670	1,964	5,026	4,564	34,656

(continued)

Appendix Table C8. (p. 3 of 4)

Stream	1981 [b]	1982 [b]	1983	1984	1985 [b]	1986 [b]	1987 [b]	1988 [b]	1989 [j]	1990 [b]
Noatak Drainage										
Noatak River below Kelly River	116,352	20,682	79,773	67,873	45,525	37,227	5,515 [bJ]	45,930 [bJ]		23,345 [b]
Eli River		189	3,044	5,027	855	4,308	2,780	8,639		3,000
Kelly River & Lake	13,770	11,604	12,137	3,499	1,200	839	950	1,460		325 [i]
Noatak River System Total	130,122	32,475	94,954	76,399	47,580	42,374	9,245	56,029		26,670
Kobuk Drainage										
Kobuk to Pah River	18	2,643 [b]	2,147	402	2,048 [i]	531				4,610
Pah River to just below Selby River	309	598 [b]	2,433	257	241 [i]	511	2,250	1,135 [b]		305
Selby River mouth & slough	8,321 [d,e]	2,454	11,683		711 [i]	673	1,470	820 [b]		420
Selby R. mouth to Beaver C.		7,268	13,011	5,910	3,278 [i]	3,282	1,350	6,890 [b]		7,505
Beaver Creek mouth		1,711	3,059							
Above Beaver Creek			1,413	4,052		1,018	3,140	3,050 [b]		2,515
Upper Kobuk River Total	8,648	14,674	33,746	10,621	6,278	6,015	8,210	11,895 [b]		15,355
Squirrel River	9,854	7,690	5,115	5,473	6,160	4,982	2,708 [c]	4,848 [b]		5,500
Salmon River	4,709	1,821 [c]	1,677	1,471	2,884	1,971	3,333	6,208		6,335
Tutuksuk River	1,114	1,322	2,637	1,132	5,098	4,257	206	3,122		2,275
Kobuk River System Total	24,325	25,507	43,175	18,697	20,420	17,225	14,457	26,073		29,465

(continued)

Stream	1991	1992 [b]	1993	1994 [i]	1995	1996	1997	1998	Aerial Escapement Goals
Noatak Drainage									
Noatak River below Kelly River	82,750	34,335	25,415		147,260	306,900	[i]	[b]	
Eli River	2,940	701	4,795		7,860	30,040	[i]	[b]	
Kelly River & Lake	654	726	9		8,384	1,427	2,792	2,631	
Noatak River System Total	86,344	35,762	30,219		163,504	338,367		[b]	84,000
Kobuk Drainage									
Kobuk to Pah River	9,840	1,030	3,896		12,190	20,700	2,248 [b]	[b]	
Pah River to just below Selby River	2,780	3,820	1,535		4,537	4,600	404 [b]	[b]	
Selby River mouth & slough	1,040	1,500	1,800		1,250	4,100	662 [b]	[b]	
Selby River	1,460	868	824		3364	14,950	853 [b]	730	
Selby R. mouth to Beaver C.	5,250	3,845	929		10,898	15,480	2,582 [b]	[b]	
Beaver Creek mouth							914 [b]	[b]	
Above Beaver Creek	4,155	740	3,174		3,486	14,940	850 [b]	[b]	
							[b]	[b]	
Upper Kobuk River Total	24,525	11,803	12,158		35,725	74,770	8,513 [b]	[b]	10,000
Squirrel River	4,606	2,765	4,463		10,605	10,740	4,779 [b]	[b]	11,500
Salmon River	5,845	1,345	13,880		13,988	23,790	1,181 [b]	[b]	7,000
Tutuksuk River	744	1,162	1,196		3,901	21,805	163 [b]	[b]	2,000
Kobuk River System Total	35,720	17,075	31,697		64,219	131,105			30,500

[a] Three aerial surveys are attempted yearly at different intervals for each tributary to assess escapements prior to the peak, at the peak and after the peak of the run. Indices listed in this table are the largest survey observed for each tributary during the given year.

[b] Poor survey conditions or incomplete, early or late survey.

[c] Survey by foot or boat.

[d] These fish are unidentified salmon, mostly chums.

[e] This figure includes fish observed from just above Selby Slough to the mouth of the Reed River.

[f] Unresolvable discrepencies in historical data put this figure in question.

[g] Unclear where these fish were observed.

[h] The figures in this table have been corrected and supercede figures in previous reports.

[i] Surveyed well before peak of migration.

[j] Unacceptable conditions.

Appendix Table C9. Kotzebue District chum salmon commercial catch age and sex composition , 1962-1998. [a]

Year	Sample Size	Percent Males	Percent Females	Percent Age Class Age-3	Age-4	Age-5	Age-6	Age-7
1962	69	26.1	73.9	7.2	63.8	27.5	1.4	0.0
1963	255	34.9	65.1	30.2	51.0	18.4	0.4	0.0
1964	463	43.6	56.4	52.9	44.9	1.7	0.4	0.0
1965	480	42.1	57.9	2.3	91.0	6.7	0.0	0.0
1966	430	40.2	59.8	10.0	67.2	22.8	0.0	0.0
1967	1,865	37.3	62.7	8.8	72.2	18.5	0.5	0.0
1968	1,989	48.2	51.8	21.2	58.1	19.8	0.9	0.0
1969	1,125	53.7	46.3	36.8	58.3	4.9	0.0	0.0
1970	267	45.3	54.7	3.7	91.0	5.2	0.0	0.0
1971	1,105	54.6	45.4	7.1	66.8	26.1	0.0	0.0
1972	980	50.9	49.1	15.8	59.5	24.1	0.6	0.0
1973	598	46.0	54.0	16.7	69.4	13.9	0.0	0.0
1974	350	47.1	52.9	28.6	63.4	7.7	0.3	0.0
1975	340	46.5	53.5	2.6	86.8	10.6	0.0	0.0
1976	566	47.9	52.1	11.1	51.4	37.3	0.2	0.0
1977	446	49.3	50.7	6.7	72.9	18.6	1.8	0.0
1978	579	49.9	50.1	10.5	57.5	31.8	0.2	0.0
1979 [b]	658	53.3	46.7	30.5	53.2	15.2	1.1	0.0
1980 [c]	710	56.3	43.7	15.1	78.2	6.6	0.1	0.0
1981 [d]	1,167	52.4	47.6	2.4	67.1	30.5	0.0	0.0
1982	983	48.8	51.2	5.9	48.3	40.3	5.5	0.0
1983 [e]	1,979	43.4	56.6	5.8	57.7	34.2	2.3	0.0
1984 [f]	2,933	50.2	49.8	14.6	64.4	19.7	1.3	0.0
1985 [g]	3,293	47.8	52.2	0.4	83.7	15.5	0.4	0.0
1986 [h]	3,095	46.0	54.0	0.3	18.6	78.9	2.2	0.0
1987 [i]	1,987	52.0	48.0	15.0	43.0	31.0	11.0	0.0
1988	3,324	48.0	52.0	6.5	74.8	16.9	1.7	0.1
1989	3,336	49.3	50.7	0.7	77.9	20.4	1.0	0.0
1990 [j]	2,497	49.4	50.6	2.3	45.6	50.7	1.4	0.0
1991	3,292	46.4	53.6	2.9	60.4	35.8	0.9	0.0
1992 [k]	3,706	39.0	61.0	0.9	58.5	37.5	3.1	0.0
1993 [l]	3,707	50.9	49.1	2.9	26.3	66.5	4.2	0.1
1994 [m]	3,744	44.8	55.2	3.3	63.0	30.8	2.9	0.0
1995	4,621	50.9	49.1	2.3	59.8	36.0	1.9	0.0
1996 [n]	2,386	50.9	49.1	0.9	36.9	52.3	9.5	0.4
1997	4,824	57.6	42.4	1.4	28.7	58.3	10.2	1.4
19 Year Avg. (1979-1997)		48.5	51.5	6.4	55.9	34.8	2.9	0.1
1998	3,043	58.4	41.6	5.4	51.8	29.2	12.8	0.7

[a] Commercial periods not sampled for years 1962 to 1978 are unknown.

[b] Commercial openings 1 and 10 not sampled due to period closure.

[c] Commercial openings 8, 13, and 15 not sampled due to period closure.

[d] Commercial openings 8, 10, 12, and 14 not sampled due to period closure.

[e] Commercial openings 11, 13, 14, and 15 not sampled due to period closure.

[f] Commercial openings 14 and 15 not sampled due to period closure.

[g] Commercial openings 1, 3, 5, 7, 9, 11, and 13 not sampled due to period closure.

[h] Commercial opening 15 not sampled due to period closure.

[i] Commercial openings 1, 2, 4, 6, 7, 8, 10, 11, 14, and 15 not sampled due to period closure.

[j] Commercial openings 11 to 15 not sampled due to period closure.

[k] Commercial opening 12 was not sampled due to period closure.

[l] Commercial openings 6, 8, 10, 11, 12, 13, 14 and 15 were closed periods. Closed periods were sampled for age and sex composition from commercial test nets and are included in the 1993 data.

[m] Commercial openings 14 and 15 were closed periods. Closed periods were sampled for age and sex composition from commercial test nets and are included in the 1994 data.

[n] The equivalent of commercial periods 8, 10, 11 and 15 were closed periods. These periods were sampled for age composition from commercial test nets and are included in the 1996 data.

Appendix Table D1. Norton Sound herring and spawn-on-kelp harvests (in short tons) by U.S. commercial fishermen, 1909-1998.

Year	Sac Roe Herring	Food or Bait Herring	Total	Spawn-on-kelp
1909-1916 [a]	-	-	-	-
1916-1928	-	1,881	1,881	-
1929	-	166	166	-
1930	-	441	441	-
1931	-	86	86	-
1932	-	529	529	-
1933	-	31	31	-
1934	-	4	4	-
1935	-	15	15	-
1936	-	-	-	-
1937	-	6	6	-
1938	-	10	10	-
1939	-	6	6	-
1940	-	14	14	-
1941	-	3	3	-
1942-1963	-	-	-	-
1964	20	-	-	-
1965	-	-	-	-
1966	12	-	-	-
1967	-	-	-	-
1968	-	-	-	-
1969	2	-	-	-
1970	8	-	-	-
1971	20	-	-	-
1972	17	-	-	-
1973	35	-	-	-
1974	2	-	-	-
1975	-	-	-	-
1976	9	-	-	-
1977	11	-	-	trace
1978	15	-	-	4
1979	1,292	-	-	13
1980	2,451	1	2,452	24
1981	4,371	-	-	47 [b]
1982	3,864	69	3,933	38
1983	4,181	401	4,582	29 [c]
1984	3,298	274	3,572	19 [d]
1985	3,420	128	3,548	- [e]
1986	4,926	268	5,194	-
1987	3,779	303	4,082	-
1988	4,256	416	4,672	-
1989	4,494	247	4,741	-
1990	5,253	1,026	6,279	-
1991	5,465	207	5,672	-
1992 [f]	-	-	-	-
1993	4,713	321	5,034	-
1994	958	2	960	-
1995	6,647	116	6,763	-
1996 [g]	6,061	109	6,220	-
1997 [h]	3,709	262	3,976	-
1998	2,623	8	2,631	9 [i]

[a] Fishery occured some years, but harvest unavailable. Fishery from 1909-1941 occured near Golovin; 1964 to present has occurred in southeast Norton Sound.

[b] Does not include approximately 6 st of wastage.

[c] Does not include approximately 2 st of wastage.

[d] Includes 3 st of spawn on Macrocystus kelp.

[e] All spawn-on-kelp fisheries closed by regulation prior to the 1985 season.

[f] No commercial fishery took place in 1992.

[g] Total includes an estimate 50 st of wastage.

[h] Total includes an estimate 5 st of wastage. Includes approximately 1,000 lbs taken as bait under 5 AAC 27.971.

[i] Includes 2,100 lbs of wild kelp and 16,083 pounds of *Macrocystic* kelp.

Appendix Table D2. Japanese gillnet herring catches in Norton Sound, 1968-1977. (North of 63 N. Latitude and East of 167 W. Longitude)

Year	Gillnet Catch (st)	Remarks
1968	131	First foreign effort on herring in Norton Sound
1969	1,400	Peak catch with large effort (about 40 ships). Two vessels apprehended.
1970	69	
1971	703	
1972	15	
1973	38	
1974	764	
1975	-	
1976	-	Data unavailable.
1977	-	Herring fishery closed to foreign nations.
Total	3,120	Excludes 1976 catches.

Appendix Table D3. Herring biomass estimates and commercial fisheries data for the Norton Sound District, 1979 -1998.[m]

Year	Biomass[a] (st)	Harvest[b] (st)	Percent[c] Exploitation	Roe %	Dollar Value (millions)	Number of Fishermen
1979	7,700	1,292	16.8	7.0	0.6	67
1980	8,400	2,452	29.2	8.1	0.5	294
1981	25,100	4,371	17.3	8.8	1.5	332
1982	17,400	3,933	22.6	8.8	1.0	237
1983	28,100	4,582	16.3	8.6	1.4	272
1984	23,100	3,662[e]	15.8	10.3	0.9	194
1985	20,000	3,548	17.7	9.9	1.4	277
1986	28,062	5,194	18.5	9.6	2.9	323
1987	32,370	4,082	12.6	8.6	2.6	564
1988	33,924	4,672	13.8	9.0	3.9	348
1989	23,857	4,771[i]	20.0	9.2	2.3	357
1990	35,522	6,439[j]	18.0	8.7	3.6	365
1991	42,854	5,796[k]	13.5[f]	9.3	2.4	279
1992	57,974	0	0.0	-	0.0	0
1993	46,549	5,034[l]	10.9	9.9	1.5	264
1994	37,829	960	2.5	10.3	0.3	215
1995	37,778	6,773	18.0	10.4	4.2	215
1996	26,596	6,220[n]	23.4	10.6	4.5	287
1997	47,748	3,976[n]	8.3	9.9	0.6	220
1998	49,464	2,640[p]	5.0	9.2	0.0	47

[a] Methods of calculating biomass have varied over the years. Biomass estimates listed follow methods used during that year.

[b] Includes both bait and sac roe harvests.

[c] Represents total District explotation.

[e] Includes an estimated 90 st of wastage.

minimum estimates; exploitation rate based on observed biomass.

[i] Includes an estimated 30 st of wastage.

[j] Includes an estimated 60 st of wastage.

[k] Includes an estimated 125 st of wastage.

[l] Does not include an estimated 45 st of wastage.

[m] No herring fishery occured in 1992.

[n] Includes an estimated 50 st of wastage.

Includes an estimated 5 st of wastage during the fishery, and approximately 1,000 lbs of bait herring taken under 5 AAC 27.971, not during the sac roe fishery.

[p] Includes sac roe, bait, and kelp harvest.

Appendix Table D4. Norton Sound commercial herring harvest (st) by subdistrict, by year, 1979 - 1998.[a]

	Subdistricts							
Year	s.d. 1	s.d. 2	s.d. 3	s.d. 4	s.d. 5	s.d. 6	s.d. 7	Totals
1979	319	405	555	0	0	0	14	1,293
1980	1,176	632	632	5	0	7	0	2,452
1981	3,068	831	471	1	0	0	0	4,371
1982	2,062	946	925	0	0	0	0	3,933
1983	434	1,265	2,733	0	65	85	0	4,582
1984	-	-	3,572	0	0	0	0	3,572
1985	1,538	188	1,675	0	147	0	0	3,548 [b]
1986	2,559	-	2,450	0	185	0	0	5,194
1987	2,218	174	1,690	0	0	0	0	4,082
1988	3,260	99	1,307	0	6	0	0	4,672
1989	3,256	60	1,425	0	0	0	0	4,741 [c]
1990	4,498	950	931	0	0	0	0	6,379 [d]
1991	0	880	4,792	0	0	0	0	5,672 [e]
1992 [f]	0	0	0	0	0	0	0	0
1993	2,288	587	1,881	0	278	0	0	5,034 [g]
1994	250	36	634	0	40	0	0	960
1995	2,359	604	1,524	0	2,108	167	0	6,762
1996	3,074	111	2,831	0	153	0	0	6,170 [h]
1997	2,046	62	1,864	0	0	0	0.5[j]	3,976 [i]
1998	1,543	0	1,081					

[a] Includes herring taken for sac roe and bait.

[b] Does not include an estimated 90 st of wastage.

[c] Does not include an estimated wastage of 30 st in abandoned gillnets.

[d] Does not include an estimated wastage of 60 st in abandoned gillnets.

[e] Does not include an estimated wastage of 125 st in abandoned gillnets.

[f] No commercial fishery in 1992.

[g] Does not include an estimated wastage of 45 st in abandoned beach seine sets.

[h] Does not include an estimated 50 st of wastage.

[i] Does not include an estimated 5 st of wastage.

j Approximately 1000 lbs of herring bait was taken under 5AAC 27.[illegible]ine (not during sac roe fishery).

Appendix Table D5. Norton Sound commercial spawn-on-kelp (Fucus) harvest, 1978-1984, 1998.

Year	Harvest (st)	Number of Fishermen
1978	4	9
1979	13	19
1980	24	20
1981	47	22
1982	38	44
1983	29	35
1984	19	32
1998	1	3

Appendix Table E1. Comparison of annual summer commercial harvest of red king crab from Norton Sound Section, Eastern Bering Sea, by statistical areas, 1977-1998 (catch in pounds).

Statistical Area	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1992	1993	1994	1995	1996[b]	1997	1998	Totals
616331	7,893																48					7,941
616401																		35				35
626331	40,020					22													61			40,103
626401	31,572			4,830	399													18,971	45,045	18,066	8,065	100,817
626402	38,995																					38,995
636330																			4,560	3,838	2,449	4,560
636401				12,398	61,823	32,246	5,880	41	891				22,030		1,159	1,373	8,087	24,329	70,677	59,206	10,771	240,934
636402																	1,754	3,466				5,220
646301																		4,628	13,888			18,516
646330					4,716								5,212					1,493	2,894	314		14,315
646401			155,972		1,319	17,532										1,963	37,222	105,045	22,834	1,052	3,194	341,887
646402	80,969					748										730	143,511	66,821				292,779
656300			161,699		15,174																	176,873
656330			323,518	72,735	395,662	3,983	24,246	83,479	7,632		79,006	36,129	1,757		4,814	265		19,745	15,446	4,661	4,078	1,068,417
656401			138,011	121,147	253,387	60,480	11,422	183,119	246,200		194,408	165,644	100,956	171	53,119	105,341	29,566	32,289	9,985	4,035	1,127	1,705,245
656402	306,302	90,187	288,869	918	3,098	2,832			132,363							193,079	106,053	44,000				1,167,701
666230		55,490			77																	55,567
666300		162,795	60,816	84,874	9,167	95		4,534											25,519			347,800
666330		353,016	505,050	367,446	141,513	8,990	1,192		389	70,615	2,963	13,020	1,275	27,185	4,305	31,758		730				1,529,447
666401		179,212	486,947	205,400	381,510	79,580	325,045	116,254	5,341	408,848	50,744	21,895	115,257	162,263	10,632	746	396		3,001	1,816		2,553,071
666402	12,036	515,778	534,938	183,581		17,585			32,992							535	1,221					1,298,666
666431			146,029															1,124				147,153
676300		13,238		126,231															546			140,015
676330		51,304	81,798	6,762	18,734																	158,598
676400		667,130	33,856	274	92,026	1,315	247		32					3,212					9,775			807,867
676430		3,811	12,309		373	3,513			1,171													21,177
676501					36																	36
686330			1,860																			1,860
Totals	517,787	2,091,961	2,931,672	1,186,596	1,379,014	228,921	368,032	387,427	427,011	479,463	327,121	236,688	246,487	192,831	74,029	335,790	327,858	322,676	224,231	92,988	29,684	12,378,583

[a] No commercial fishery occured in 1991.

[b] Does not include approximately 2,490 lbs not reported on fish tickets.

Appendix Table E2. Percent recruit and postrecruit size male red king crab from commercial catch samples by by year, Norton Sound Section, Bering Sea.

Year	Recruits[a] %	Postrecruits[b] %
1977	53	47
1978	29	71
1979	33	67
1980	15	85
1981	10	90
1982	27	73
1983	55	45
1984	59	41
1985	45	55
1986	49	51
1987	22	78
1988	25	75
1989	23	77
1990	21	79
1991 [c]	-	-
1992	28	72
1993	31	69
1994	20	80
1995	36	64
1996	30	70
1997	49	51
1998	32	68

[a] Recruits = All new shell, legal size, male king crab of carapace length <116mm.

[b] Postrecruits = All other, legal size, male king crab.

[c] No Summer Commercial Fishery in 1991.

Appendix Table E3. Historic summer commercial red king crab economic performance, Norton Sound Section, Bering Sea, 1977 - 1998.

Year	Guidline Harvest Level (lbs) [b]	Legal Male Pop. Est.(lbs) [b]	Commercial Harvest (lbs) [a,b]	Number of Vessels	Number of Permits	Number of Landings	Number of Pots Registered	Number of Pots Pulls	Exvessel Price/lb	Fishery Value (millions $)	Season Length Days	Season Length Dates
1977	[d]	10.0	0.52	7	7	13	[d]	5,457	0.75	0.229	60	[d]
1978	3.00	11.0	2.09	8	8	54	[d]	10,817	0.95	1.897	60	6/7-8/15
1979	3.00	5.4	2.93	34	34	76	[d]	34,773	0.75	1.878	16	7/15-7/31
1980	1.00	6.6	1.19	9	9	50	[d]	11,199	0.75	0.890	16	7/15-7/31
1981	2.50	4.7	1.38	36	36	108	[d]	33,745	0.85	1.172	38	7/15-8/22
1982	0.50	1.3	0.23	11	11	33	[d]	11,230	2.00	0.405	23	8/9-9/1
1983	0.30	2.1	0.37	23	23	26	3,583	11,195	1.50	0.537	3.8	8/1-8/5
1984	0.40	2.7	0.39	8	8	21	1,245	9,706	1.02	0.395	13.6	8/1-8/15
1985	0.45	2.4	0.43	6	6	72	1,116	13,209	1.00	0.427	21.7	8/1-8/23
1986	0.42	2.8	0.48	3	3	[d]	578	4,284	1.25	0.600	13	8/1-8/25 [e]
1987	0.40	2.2	0.33	9	9	[d]	1,430	10,258	1.50	0.491	11	8/1-8/12
1988	0.20	3.2	0.24	2	2	[d]	360	2,350	[d]	[d]	9.9	8/1-8/11
1989	0.20	3.2	0.25	10	10	[d]	2,555	5,149	3.00	0.739	3	8/1-8/4
1990	0.20	3.2	0.19	4	4	[d]	1,388	3,172	[d]	[d]	4	8/1-8/5
1991 [c]	0.34	3.4										
1992	0.34	3.4	0.07	27	27	[d]	2,635	5,746	1.75	0.130	2	8/1-8/3
1993	0.34	3.4	0.33	14	20	208	560	7,063	1.28	0.430	52	7/1-8/28 [f]
1994	0.34	3.4	0.32	34	52	407	1,360	11,729	2.02	0.646	31	7/1-7/31
1995	0.34	3.4	0.32	48	81	665	1,900	18,782	2.87	0.926	67	7/1-9/5
1996	0.34	3.4	0.22	41	50	264	1,640	10,453	2.29	0.519	57	7/1-9/3 [g]
1997	0.08	1.6	0.09	13	15	100	520	2,982	1.98	0.184	44	7/1-8/13 [h]
1998	0.08	1.6	0.03	8	11	50	320	1,639	1.47	0.041	65	7/1-9/3 [l]

[a] Deadloss included in total.

[b] Millions of pounds.

[c] No summer commercial fishery.

[d] Information not available.

[e] Fishing actually began 8/12.

[f] Fishing actually began 7/8.

[g] Fishing began 7/9 due to fishermen's strike.

[h] First delivery was made 7/10.

l First delivery was made 7/16.

Appendix Table E4. Winter commercial and subsistence red king crab harvests, Norton Sound, Bering Sea, 1978-1998.

COMMERCIAL			SUBSISTENCE						
Year[a]	Number of Fishermen	# Crab Harvested	Winter[b]	Permits Issued	Permits Returned	Permits Fished	Total Crab Captured[c]	Total Crab Harvested[d]	Average Harvest/fm
1978	37	9,625	1977 -78	290	206	149	[e]	12,506	84
1979	1	221	1978 -79	48	43	38	[e]	224	6
1980	1	22	1979 -80	22	14	9	[e]	213	24
1981	0	0	1980 -81	51	39	23	[e]	360	16
1982	1	17	1981 -82	101	76	54	[e]	1,288	24
1983	5	549	1982 -83	172	106	85	[e]	10,432	123
1984	8	856	1983 -84	222	183	143	15,923	11,220	78
1985	9	1,168	1984 -85	203	166	132	10,757	8,377	63
1986	5	2,168	1985 -86	136	133	107	10,751	7,052	66
1987	7	1,040	1986 -87	138	134	98	7,406	5,772	59
1988	10	425	1987 -88	71	58	40	3,573	2,724	68
1989	5	403	1988 -89	139	115	94	7,945	6,126	65
1990	13	3,626	1989 -90	136	118	107	16,635	12,152	114
1991	11	3,800	1990 -91	119	104	79	9,295	7,366	93
1992	13	7,478	1991 -92	158	149	105	15,051	11,736	112
1993	8	1,788	1992 -93	88	79	37	1,193	1,097	30
1994	25	5,753	1993 -94	118	95	71	4,894	4,113	58
1995	42	7,538	1994 -95	166	131	97	7,777	5,426	56
1996	9	1,778	1995 -96	84	44	35	2,936	1,679	48
1997	2	83	1996 -97	38	22	13	1,617	745	57
1998	5	984	1997 -98	94	73	64	20,327	8,622	135

[a] Prior to 1985 the winter commercial fishery occured from January 1 thru April 30; as of March 1985, the winter commercial season was is open by regulation from November 15 thru May 15.

[b] The winter subsistence fishery occurs during months of two calendar years (as early as December, thru May).

[c] The number of crab actually caught; some crab may have been released.

[d] The number of crab "Harvested" is the number of crab caught and kept.

[e] Data unavailable.

Appendix Table E5. Results of population assessment surveys conducted for red king crab in Norton Sound since 1976.

Year	Date	Research Agency	Gear	Population Abundance Estimates (Number of crab) Pre-2 Males [b]	Pre-1 Males [b]	Legal Males [a]
1976	9/2 - 9/5, 9/16 – 10/7	NMFS	Trawl	331,555	808,091	1,742,755
1979 [e]	7/26 - 8/5	NMFS	Trawl			809,799
1980 [d]	7/4 – 7/14	ADF&G	Pots			1,900,000
1981	6/28 - 7/14	ADF&G	Pots			1,285,195
1982	7/6 - 7/20	ADF&G	Pots			353,273
1982	9/5 - 9/11	NMFS	Trawl	356,724	832,581	877,722
1985	7/1 - 7/14	ADF&G	Pots			907,579
1985	9/16 - 10/1	NMFS	Trawl	466,858	707,140	1,051,857
1988	8/16 - 8/30	NMFS	Trawl	565,255	493,030	978,748
1991	8/22 - 8/30	NMFS	Trawl	294,801	303,682	1,287,486
1996	9/7 - 9/18	ADF&G	Trawl	452,580	325,699	536,235

[a] Legal male red king crab were defined as at least 105 mm in carapace length for the 1996 ADF&G trawl survey and all NMFS trawl surveys except the 1979 survey which defined legal males as at least 100 mm in carapace length. ADF&G pot surveys defined legal males as at least 121 mm in carapace width.

[b] Pre-2 males were defined as 76-89 mm in carapace length and pre-1 males were defined as 90-104 mm in carapace length.

[c] Population estimates are valid for the date of the survey (i.e., either before or after the summer commercial fishery).

[d] The 1980 pot survey estimate has been revised from the original estimate of 13.4 million pounds which was thought inaccurate due to an under-reporting of recovered tagged crab.

[e] Pre-2 male and pre-1 male data is unavailable for the 1979 NMFS trawl survey.

Appendix Table E6. Size composition by percent of red king crab from winter research pots near Nome, Norton Sound, Bering Sea, 1983-1998.[a]

	SUBLEGAL			LEGAL		
Year	Prerecruit Twos	Prerecruit Ones	Totals	Recruits	Post-Recruits	Totals
1983	26	38	64	26	10	36
1984	35	31	66	19	16	35
1985	25	45	70	20	10	30
1986	26	35	61	22	17	39
1987	13	31	44	11	45	56
1988 [b]	-	-	-	-	-	-
1989	27	15	42	27	31	58
1990	16	33	49	25	26	51
1991	5	30	35	34	31	65
1992 [c]	-	-	-	-	-	-
1993	3	9	12	17	71	88
1994 [c]	-	-	-	-	-	-
1995	10	11	23 [d]	32	45	77
1996	22	33	64 [d]	10	26	36
1997	32	21	64 [d]	14	22	36
1998	36	44	82 [d]	9	9	18

[a] Sublegals = male crab less than 4 3/4" carapace width.
Pre-recruit Ones = Sulegals greater than 89mm in carapace length.
Pre-recruit Twos = Sublegals smaller than 90mm in carapace length.

Legals = male king crab greater than 4 3/4" carapace width.
Recruits = Legal new shell crab smaller than 116mm in carapace length.
Post-recruits = all non-recruit legal males.

[b] No data collected in 1988 due to poor ice conditions.

[c] No winter crab research study in 1992 or 1994.

[d] Includes prerecruit threes.

Appendix Table F1. Kotzebue District winter commercial sheefish harvest statistics, 1967- 998. [a]

Year [b]	No. of Fishermen	No. of Fish	Pounds Total	Pounds Average	Price/ Pound	Estimated Value
1967 [c]		4,000	26,000	6.5	$0.20	$5,200
1968	10	792	4,752	6.0	$0.22	$1,045
1969	17	2,340	15,209	6.5	$0.25	$3,802
1970 [c]		2,206			$0.14	
1971	4	73	720	9.9	$0.13	$95
1972	5	456	4,071	8.9	$0.16	$651
1973	11	2,322	15,604	6.7	$0.20	$3,121
1974	6	1,080 [d]	6,265	5.8	$0.30	$1,880
1975	[c]	2,543 [d]	24,161	9.5	$0.30	$7,248
1976	14	2,633	19,484	7.4	$0.30	$5,845
1977	2	566	5,004	8.8	$0.30	$1,501
1978	11	2,879	26,200	9.1	$0.40	$10,480
1979 [e]						
1980	4	1,175	8,225	7.0	$0.50	$4,113
1981	1	278	1,836	6.6	$0.75	$1,377
1982	11	2,629 [f]	17,376	6.6	$0.75	$13,032
1983	8	1,424	13,395	9.4	$0.50	$6,698
1984	5	927 [d]	10,403	11.2	$0.55	$5,722
1985	4	342 [d]	3,902	11.4	$0.51	$1,990
1986	2	26	312	12.0	$0.75	$234
1987	3	670	5,414	8.1	$0.49	$2,653
1988	3	943	7,373	7.8	$0.45	$3,318
1989	8	2,335	16,749	7.2	$0.51	$8,542
1990 [c]	6	687	5,617	8.2		
1991	5	852	8,224	9.7	$0.50	$4,112
1992	3	289	2,850	9.9	$0.65	$1,853
1993	1	210 [d]	1,700	8.1	$0.50	$850
1994 [e]						
1995	1	226	2,240	9.9	$0.50	$1,120
1996	2	308	3,002	9.7	$0.44	$1,321
1997 [e]						
1998 [e]						

[a] Data is not exact, in some instances total catch poundage was determined from average weight and catch data. Similarly, various price/pound figures were determined from price/ fish and average weight data.

[b] Season was from October 1 to September 30. Year indicated would be the year the commercial season ended. For example, the year 1980 would represent October 1, 1979 to September 30, 1980.

[c] Data unavailable or incomplete.

[d] Number of fish not always reported. Estimates were based on average weight from reported sales which documented the number of fish.

[e] No reported commercial catches.

[f] Estimate based on historical average weight.

Appendix Table F2. Kotzebue District reported subsistence harvests of sheefish, 1966-1998. [a]

Year	Number of Fishermen Interviewed	Reported Harvest	Average Catch per Fisherman
1966-1967	135	22,400	166
1967-1968	146	31,293	214
1968-1969	144	11,872	82
1970	168	13,928	83
1971	155	13,583	88
1972	79	3,832	49
1973	65	4,883	75
1974	58	1,062	18
1975	69	1,637	24
1976	57	966	17
1977	95	1,810	19
1978	95	1,810	19
1979	75	3,985	53
1980	74	3,117	42
1981	62	6,651	107
5/82-4/83 [b,c]	130	4,704	36
5/83-4/84 [b,c]	27	764	28
5/84-9/84 [b]	30	2,803	93
1985 [d]	2	60	30
1986 [b,d]	72	721	10
1987 [d]	46	276	6
1988 [d]			
1989			
1990			
1991	40	2,180	55
1992	43	2,821	66
1993	46	2,441	53
1994	171	3,181	19
1995 [e]	314	9,465	30
1996 [e]	389	6,953	18
1997 [e]	338	9,805	24.6
1998 [e]	435	5,350	13.6

[a] To obtain individual village catches during years previous to 1982, refer to the 1982 Annual Management Report. Due to limited effort during many years, total catch and effort should be regareded as minimum figures only and are not comparable year to year.

[b] Catch by village for these years are presented in separate tables in respective year annual management reports.

[c] Sumer catches only: winter catches were not documented.

[d] Villages were not surveyed for subsistence sheefish harvests from 1985 to 1990; figures shown are catches reported during the fall chum salmon subsistence surveys and may include summer as well as winter harvests.

[e] Subsistence sheefish harvests are from villages on Kobuk River.

Appendix Table F3. Peak annual aerial survey counts of sheefish in the Kobuk and Selawik Rivers, 1966-1998.[a]

Year	Kobuk River	Abundance Estimate for Kobuk River spawning area[e]	Selawik River	Total
1966	1,200		[c]	1,200
1967	1,025		[c]	1,025
1968	4,973		1,234	6,207
1969	3,654		[c]	3,654
1970	3,220		[c]	3,220
1971	8,166		1,196	9,362
1972	[b]		[c]	
1973	[c]		[c]	
1974	[b]		[c]	
1975	[b]		[c]	
1976	73		[c]	73
1977	[c]		[c]	
1978	2,824		[c]	2,824
1979	1,772		[c]	1,772
1980	250 [d]		[c]	250
1981	[b]		[c]	[b]
1982	1,009 [d]		[c]	1,009
1983	2,604		[c]	2,604
1984	[c]		[c]	
1985	[c]		[c]	
1986	[c]		[c]	
1987	[c]		[c]	
1988	[c]		[c]	
1989	[c]		[c]	
1990	[c]		[c]	
1991	17,335		[c]	17,335
1992	3,310		[c]	3,310
1993	[c]		[c]	
1994	[c]		[c]	
1995	1,840	32,273	[c]	1,840
1996	[c]	43,036	[c]	
1997	[c]	26,782	[c]	
1998	[c]		[c]	

[a] Counts are considered minimal as conditions ranged from poor to good.

[b] No fish reported.

[c] Not surveyed.

[d] Probably more sheefish than listed; species identification problems.

[e] Mark recapture abundance estimates for Kobuk River spawning area conducted

Appendix Table F4. Kotzebue District incidentally caught and sold Dolly Varden during the commercial salmon fishery, 1966-1998.

Year	Number of Fish Sold	Estimated Total Catch [g]	Pounds Sold	Average Weight [d]	Average Price
1966	3,325				0.55 [f]
1967	367		2,606	7.1	0.11
1968	3,181		21,949	6.9	0.14
1969	1,089 [a]				2.84 [f]
1970	2,095				
1971	3,828 [b]		23,353	6.1	0.16
1972	7,746		56,545	7.3	0.17
1973	640		4,608	7.2	0.16
1974	2,605 [c]		20,580	7.9	0.16
1975					
1976					
1977					
1978	1,229		9,094	7.4	0.15
1979	2,523		12,523	5.0	0.25
1980	3,049		17,015	5.6	0.20
1981	3 [e]		16	5.3	0.17
1982	3,447		23,648	6.9	0.20
1983	190 [e]	845	1,108	5.8	0.20
1984	347 [e]	1,090	2,104	6.1	0.25
1985	454	3,600	3,177	7.0	0.25
1986	5 [e]	2,373	34	6.8	0.20
1987	1,261	[h]	8,704	6.9	0.30
1988	752	[h]	4,967	6.6	0.35
1989	3,093	[h]	20,293	6.6	
1990	604	[h]	4,219	7.0	0.25
1991	6,136	[h]	40,747	6.6	0.18
1992	1,977	[h]	11,951	6.0	0.10
1993	76	[h]	540	7.1	0.10
1994	149	[h]	767	5.1	0.17
1995	2,090	[h]	13,195	6.3	0.20
1996	188	[h]	1,153	6.1	0.25
1997	3,320	[h]	23,203	7.0	0.20
1998	349	[h]	2,640	7.6	0.20

[a] Includes 269 taken by permit.

[b] Includes 179 taken by permit.

[c] Includes 234 taken during commercial sheefish fishery.

[d] Some data extrapolated from average reported weight.

[e] Limited Dolly Varden market; many fish were taken home or dumped.

[f] Price per fish.

[g] Estimate includes fish caught but not sold based on interviews of fishermen.

[h] Estimate of Dolly Varden caught (but not sold) not made.

Appendix Table F5. Subsistence harvests of Dolly Varden from the villages of Kivalina and Noatak, 1959-1998.

	Kivalina		Noatak	
Year	Number	Pounds	Number [d]	
1959 [a]	34,240	85,600		
1960 [a]	49,720	124,300		
1962			27,623	
1963			4,130	
1968 [e]	49,512	120,214		
1969	64,970	152,750	32,350	
1970	33,820	79,420	3,700	
1971	29,281	68,518	5,320	
1972	48,807	114,637	1,492	
1973 [b]				
1979 [c]	14,600		9,060	
1980			7,220	
1981	15,000-18,000		3,056	
1982	18,438 [e]		2,676	[b,f]
1983	16,270 [c]		4,545	
1984	12,000 [c]		2,542	
1985	10,500 [c]			
1986	7,436 [c]		46	[h]
1987 [g]			1,376	[h]
1988				
1989				
1990				
1991 [g]			4,814	
1992 [g]			4,395	
1993 [g]			4,275	
1994				
1995 [g]			5,762	
1996 [g]			5,031	
1997 [g]			4,763	
1998 [g]			3,872	

[a] From Saario, Doris J. and Brian Kessel. 1966. Environment of Cape Thompson Region, Alaska. U.S. Atomic Commision.

[b] Storm and ice conditions prevented fall harvest.

[c] Harvest data from Division of Sport Fish surveys.

[d] No data available on poundage.

[e] Harvest data from Stephen Braund and Associates.

[f] Expanded estimates (see text on subsistence fishery in the 1982 Annual Management Report).

[g] ADF&G, Div. Of Subsistence, household surveys in Noatak.

[h] Subsistence fishermen just beginning to beach seine at the time of this survey.

Appendix Table F6. Aerial survey counts of overwintering and spawning Dolly Varden in the Kotzebue District 1968-1998. [a]

Year	Noatak River Spawner Survey [b]	Overwintering	
		Wulik River [e]	Kivalina River [e]
1968		90,236	27,640
1969		297,257	
1976		68,300	12,600
1977 [d]			
1978 [d]			
1979		55,030	15,744
1980		113,553	39,692
1981	7,922	101,826	45,355
1982	8,275	65,581	10,932
1983	2,924 [c]	[d]	[d]
1984	9,130	30,923	5,474
1985	10,979		
1986	[f]	5,590	5,030
1987	[f]	[f]	[f]
1988	[f]	80,000 [c]	[f]
1989	[f]	56,384	[f]
1990	7,261	[f]	[f]
1991	9,605	126,985	35,275
1992	[f]	135,135	[d]
1993	9,560	144,138	16,534
1994	[f]	66,752	[f]
1995	6,500	128,705	28,870
1996	12,184	61,005	[f]
1997	[f]	95,412	[f]
1998	[f]	104,043	[f]

[a] Counts are considered minimal as data listed includes both poor and good surveys.

[b] Includes spawner counts on the Kelly, Kugurorok and Nimiuktuk Rivers, tributaries of the Noatak River.

[c] Incomplete survey.

[d] Poor weather hampered or prevented survey.

[e] Surveys conducted by Division of Sport Fish since 1979.

[f] Not surveyed.

Appendix G2. ADF&G studies conducted within the Norton Sound, Port Clarence, and Kotzebue Districts, 1998.

HERRING

Herring Test Fishing

a)Location: Norton Sound ocean waters; camps located at Cape Denbigh and Klikitarik; a third test fish crew operated out of Unalakleet.

b)Description: To determine age class composition of the Norton Sound herring return through test fishing with variable mesh gill nets and collection of commercial catch samples.

SALMON

Unalakleet Salmon Escapement Studies

a)Location: Unalakleet River

b)Description: To maintain an index of salmon migration up the Unalakleet River using test gill nets. Sample commercial catch for age and size.

North River Counting Tower

a)Location: North River, approximately 20 minutes by boat from the village of Unalakleet.

b)Description: Cooperative project funded and operated by Kawerak Incorporated. Determine daily and seasonal timing and magnitude of the salmon escapements.

Shaktoolik River Salmon Counting Tower

a)Location: Approximately 5 miles upstream from the mouth of the Shaktoolik River in Norton Sound.

b)Description: To determine daily and seasonal timing and magnitude of the spawning salmon escapements. Compare aerial survey totals with tower counts in order to improve survey accuracy. As time and personnel allow, collect age and sex data through escapement sampling of subsistence catches, beach seining or carcass sampling.

Kwiniuk River Salmon Counting Tower

a)Location: Approximately five miles upstream from the mouth of the Kwiniuk River in Norton Sound.

b)Description: Determine daily and seasonal timing and magnitude of chum and pink salmon escapements. Determine age, sex and size of chinook and chum salmon of the commercial harvest in Moses Point Subdistrict and in the Kwiniuk River escapement.

Niukluk River Salmon Counting Tower

a)Location: About five miles upstream from the mouth of the Niukluk River in Norton Sound.

b)Description: Determine daily and seasonal timing and magnitude of the salmon escapements.

Eldorado River Counting Tower

a)Location: Above the furthest upstream connecting channel to the Flambeau River, approximately 45 minutes by boat from the Safety Sound highway bridge.

b)Description: Cooperative project funded and operated by Kawerak Incorporated. Determine daily and seasonal timing and magnitude of the salmon escapements.

Nome River Salmon Counting Weir

a)Location: Nome River, approximately 4 miles east of Nome, Norton Sound.

b)Description: Determine daily and seasonal timing and magnitude of the spawning salmon runs. Compare aerial survey totals with tower counts in order to improve survey accuracy. As time and personnel allow, collect age and sex data through escapement sampling of subsistence catches, beach seining or carcass sampling.

Snake River Counting Tower

a)Location: Snake river, approximately 5 miles from Nome where turns north.

b)Description: Cooperative project funded and operated by Kawerak Incorporated. Determine daily and seasonal timing and magnitude of the salmon escapements.

Pilgrim River Counting Tower

a)Location: Pilgrim River, approximately ½ mile upstream from the end of the Pilgrim Hot Springs road.

b)Description: Cooperative project funded and operated by Kawerak Incorporated. Determine daily and seasonal timing and magnitude of the salmon escapements.

Northwest Salmon Biological / Rehabilitation Projects

1). Hobson Creek Instream Incubation Project

a)Location: A spring fed tributary to the Nome River

b)Description: Instream incubator boxes for supplemental chum salmon production.

2). Boulder Creek Instream Incubation Project

a)Location: A spring fed tributary to the Snake River

b)Description: Instream incubator boxes for supplemental chum salmon production.

3). Salmon Lake Instream Incubation Project

a)Location: A spring fed tributary to the Salmon Lake

b)Description: Experimental instream incubator boxes for supplemental sockeye salmon production.

6). Salmon Lake Limnology Project

a)Location: A 1,851 acre lake at the headwaters of the Pilgrim River which drains into Port Clarence.

b)Description: To apply liquid fertilizer to restore the sockeye population to historic levels and to obtain limnological and biological data to evaluate the effectiveness of fertilizer application.

7). Glacial Lake Limnology Project

a)Location: A 986 acre lake at the headwaters of the Sinuk River which drains into the Bering Sea.

b)Description: To obtain limnological and biological data to evaluate the potential to restore the sockeye population to historic levels.

Kobuk River Test Fish Project

a)Location: Lower Kobuk River near Kiana

b)Description: 1) To evaluate the chum salmon abundance migrating into the Kobuk River drainage using systematic drift gill net catches. 2) To assess, in a qualitative way, the impact of the Kotzebue District commercial salmon fishery on chum salmon abundance into the Kobuk River drainage for fisheries management purposes.
3) Describe the migratory timing for chum salmon in the lower Kobuk River. 4) Sample for age, sex and size.

Subsistence Salmon Fishing Surveys

a)Location: Norton Sound, Port Clarence, and Kotzebue Districts.

b)Description: Determine subsistence utilization of salmon for formulating management procedures and goals. House-to-house surveys were conducted in the Norton Sound, Port Clarence, and Kotzebue District surrounding villages by the Division of Subsistence. Subsistence salmon permits were issued in the Nome Subdistrict.

CRAB

Nearshore Winter King Crab Study

a)Location: Ocean waters of Norton Sound, 1 to 1.5 miles south of Nome.

b)Description: Document the abundance and distribution of red king crab in nearshore Nome waters. Tag all male new shell red king crab with carapace length <= 100 mm.

Appendix G3. Emergency Orders issued during 1998.

Emergency Order Number	Effective Date	Action Taken	Comments
3- H-Z-1-98	May 22, 1998	This emergency order opens Subdistricts 1, 2, and 3 to commercial gillnet herring fishing beginning at 12:00 noon until further notice. Each vessel may operate 100 fathoms of gillnet.	The first herring are arriving at the spawning beds of southern Norton Sound. Quantities are low and roe quality is affected by the high proportion of males. There is a limited market for sac roe herring this season and the harvest is anticipated to fall far short of the harvest guideline. In an attempt to maximize the harvest, the herring fishery is opening early and will be left open so that those fishers with a market can make the most of the limited fishery. Both buyers have expressed concern that they can not accommodate all the fishers that wish to participate in the fishery. Permit holders are cautioned to be sure they can sell their fish before fishing. If the buyer will not accept the catch it will be the responsibility of the permit holder to find a use for the herring. Do not dump your herring. The permit holder can be cited if the fish are wasted.
3-H-Z-2-98	May 29, 1998	This emergency order opens Subdistrict 1, from Wood Point to Spruce Creek, to commercial spawn on wild kelp harvest, beginning at 6:00 p.m. May 29, until 4:00a.m. May 30.	Several Norton Sound herring permit holders have approached the department staff regarding their wish to commercially harvest herring spawn on wild kelp. They have limited markets for that product. On May 22, an emergency regulation was approved to allow the commercial harvest of herring spawn on wild kelp in order to provide an opportunity for those permitees that have been unable to find other markets for the abundant herring resource of Norton Sound. Only permit holders whom have not participated in the gillnet or the spawn on imported kelp fishery may participate in this fishery. The regulation is patterned after the Togiak wild kelp fishery. Only permit holders may harvest kelp. Only permitees may move containers of kelp product during the opening. Crewmembers may only assist in moving product after the closure. The opening is timed to coincide with a monthly low tide and to close as the tide rises. Since there is no local market for the harvest, permitees are reminded they must conform to the reporting regulations for the sale of commercial fish. You must provide the Unalakleet office with a fish ticket for each permitee's harvest. Prospective kelpers are advised to contact the staff to check their permits and be sure they will not be in violation.
3- H-Z-2a-98	May 29, 1998	This emergency order opens Subdistrict 1, from Wood Point to Spruce Creek, to to commercial spawn on wild kelp harvest beginning at 6:00 p.m. Friday May 29 until 4:00 a.m. Saturday May 30.	Several Norton Sound herring permit holders have approached the department staff regarding their wish to commercially harvest herring spawn on wild kelp. They have limited markets for that product. On May 22 an emergency regulation was approved to allow the commercial harvest of herring spawn on wild kelp in order to provide an opportunity for those permitees that have been unable to find other markets for the abundant herring resource of Norton Sound. Only permit holders whom have not participated in the gillnet or the spawn on imported kelp fishery may participate in this fishery. The regulation is patterned after the Togiak wild kelp fishery. Only permit holders may harvest kelp. Only permitees may move containers of kelp product during the opening. Crew members may only assist in moving product after the closure. The opening is timed to coincide with a monthly low tide and to close as the tide rises. Since there is no local market for the harvest, permitees are reminded they must conform to the reporting regulations for the sale of commercial fish. You must provide the Unalakleet office with a fish ticket for each permitee's harvest. Prospective kelpers are advised to contact the staff to check their permits and be sure they will not be in violation.

Appendix C3. Emergency Orders issued during 1998.

Emergency Order Number	Effective Date	Action Taken	Comments
3-H-Z-3-98	June 1, 1998	This emergency order opens Subdistricts 1, 2, 3, 4, 6, and 7 to commercial gillnet herring fishing beginning at 12:00 noon until noon June 7. Each vessel may operate 100 fathoms of gillnet.	Participation in the commercial herring fishery has dropped during the last few days due to declining abundance of herring with mature roe. The two companies that have been buying herring have expressed an interest in continuing the low-level fishery. The leading edge of spawning and high roe quality herring is now near Cape Darby. Subdistrict 5 has been closed to sac roe fishing to facilitate the spawn on kelp fishery; however, the other northern subdistricts are potential fishing locations. The commercial harvest is not anticipated to reach the harvest guideline and as a result the fishery does not present a conservation concern. In an attempt to maximize the harvest, the herring fishery was opened early and will be left open so that those fishers with a market can make the most of the limited fishery. Both buyers have expressed concern that they can not accommodate all the fishers that wish to participate in the fishery. Permit holders are cautioned to be sure they can sell their fish before fishing. If the buyer will not accept the catch it will be the responsibility of the permit holder to find a use for the herring. Do not dump your herring. The permit holder can be cited if the fish are wasted.
3-H-Z-4-98	June 1, 1998	This emergency order opens Subdistrict 1, from Wood Point to Spruce Creek, to commercial spawn on wild kelp harvest beginning at 9:00 p.m. Monday June 1 until 4:00 a.m. Tuesday June 2.	Several Norton Sound herring permit holders have approached the department staff regarding their wish to commercially harvest herring spawn on wild kelp. They participated in the first opening and successfully sold their harvest. They have another market and wish to participate in a second harvest. It is now approaching the time when the eggs laid during the first spawn will eye. Eyed eggs are not marketable and harvesters are cautioned to examine the spawn before harvesting. On May 22 an emergency regulation was approved to allow the commercial harvest of herring spawn on wild kelp in order to provide an opportunity for those permitees that have been unable to find other markets for the abundant herring resource of Norton Sound. Only permit holders whom have not participated in the gillnet or the spawn on imported kelp fishery may participate in this fishery. The regulation is patterned after the Togiak wild kelp fishery. Only permit holders may harvest kelp. Only permitees may move containers of kelp product during the opening. Crew members may only assist in moving product after the closure. The opening is timed to coincide with a monthly low tide and to close as the tide rises. Since there is no local market for the harvest, permitees are reminded they must conform to the reporting regulations for the sale of commercial fish. You must provide the Unalakleet office with a fish ticket for each permitee's harvest. Prospective kelpers are advised to contact the staff to check their permits and be sure they will not be in violation.

Appendix G3. Emergency Orders issued during 1998.

Emergency Order Number	Effective Date	Action Taken	Comments
3-H-Z-5-98	June 7, 1998	This emergency order extends commercial herring gillnet fishing in Subdistricts 1, 2, 3, 4, 6, and 7 from 12:00 noon Sunday June 7 until 12:00 noon Wednesday June 10. Each vessel may operate a maximum of 100 fathoms of gillnet.	Participation in the commercial herring fishery has dropped during the last several days due to declining abundance of herring with mature roe. Only one of the two companies that have been buying herring has expressed an interest in continuing the low level fishery. The leading edge of spawning and high roe quality herring is near Cape Darby and dispersing. Subdistrict 5 has been closed to sac roe fishing to facilitate the spawn on kelp fishery; however, the other northern subdistricts are potential fishing locations. The commercial harvest is not anticipated to reach the harvest guideline and as a result the fishery does not present a conservation concern. In an attempt to maximize harvest, the herring fishery was opened early and will be left open so that those fishers with a market can make the most of the limited fishery. Both buyers have expressed concern that they can not accommodate all the fishers that wish to participate in the fishery. Permit holders are cautioned to be sure they can sell their fish before fishing. If the buyer will not accept the catch it will be the responsibility of the permit holder to find a use for the herring. Do not dump your herring. The permit holder can be cited if the fish are wasted.
3-H-Z-6-98	June 9, 1998	This emergency order extends commercial herring gillnet fishing in Subdistrict 7 from 12:00 noon Tuesday, June 9 until 12:00 noon Wednesday, June 17. Each vessel may operate a maximum of 100 fathoms of gillnet.	The sac roe commercial fishery is now closed in the southern subdistricts of Norton Sound. There is a limited market for bait herring here at Nome. Both the king crab and halibut fisheries will require bait. Several fishers have requested an opening so that they could meet this market. The Norton Sound herring harvest is well below 3,000 st and far from the estimated harvestable surplus of 8,000 st. There is no conservation concern with an additional herring harvest. A survey flown on June 8, found schools of herring distributed along the coast as far west as the Cripple River mouth. Herring abundance should be high in the vicinity of Nome for the next several days. In an attempt to maximize harvest, the herring fishery is now open and will be left open for the next week so that those fishers with a market can make the most of the limited fishery. Commercial herring permitees are advised to secure a market before fishing. Do not dump your herring. The permit holder can be cited if the fish are wasted.
3-H-Z-7-98	June 17, 1998	This emergency order extends commercial herring gillnet fishing in Subdistrict 7 from 12:00 noon Wednesday, June 17 until 12:00 noon Wednesday, June 24. Each vessel may operate a maximum of 100 fathoms of gillnet.	A limited commercial bait herring fishery has been under way in the Nome area during the past week. There is a small market for bait herring to meet the needs of the king crab and halibut fisheries later this summer. Several fishers have requested an opening so that they could meet this market. The Norton Sound herring harvest is well below 3,000 st and far from the estimated harvestable surplus of 8,000 st. There is no conservation concern with an additional herring harvest. A survey flown on June 11, found schools of herring distributed along the coast as far west as the Brevig Mission spring camp near Point Spencer. Herring abundance is expected to decline in the vicinity of Nome for the next several days. In an attempt to maximize harvest, the herring fishery is now open and will be left open for the next week so that those fishers with a market can make the most of the limited fishery.

Appendix C3. Emergency Orders issued during 1998.

Emergency Order Number	Effective Date	Action Taken	Comments
3-H-Z-8-98	June 24, 1998	This emergency order extends commercial herring gillnet fishing in Subdistrict 7 from 12:00 noon Wednesday, June 24 until 12:00 noon Wednesday, July 1. Each vessel may operate a maximum of 100 fathoms of gillnet.	A limited commercial bait herring fishery has been under way in the Nome area during the past three weeks. There is a small market for bait herring to meet the needs of the king crab and halibut fisheries later this summer. Several fishers have requested an opening so that they could meet this market. The Norton Sound herring harvest is well below 3,000 st and far from the estimated harvestable surplus of 8,000 st. There is no conservation concern with the expected additional herring harvest. Herring continue to migrate through the subdistrict, making them available to harvest. A market still exists for bait and the slow harvest rate is satisfactory for facilitating freezing and storage in the existing facilities.
3-H-Z-9-98	July 1, 1998	This emergency order extends commercial herring gillnet fishing in Subdistrict 7 from 12:00 noon Wednesday, July 1 until 12:00 noon Wednesday, July 8. Each vessel may operate a maximum of 100 fathoms of gillnet.	A limited commercial bait herring fishery has been under way in the Nome area during the past four weeks. There is a small market for bait herring to meet the needs of the king crab and halibut fisheries later this summer. Several fishers have requested an opening so that they could meet this market. The Norton Sound herring harvest is well below 3,000 st and far from the estimated harvestable surplus of 8,000 st. There is no conservation concern with the expected additional herring harvest. Herring continue to migrate through the subdistrict, making them available to harvest. A market still exists for bait and the slow harvest rate is satisfactory for facilitating freezing and storage in the existing facilities.
3-H-Z-10-98	July 8, 1998	This emergency order extends commercial herring gillnet fishing in Subdistrict 7 from 12:00 noon Wednesday, July 8 until 12:00 noon Wednesday, July 15. Each vessel may operate a maximum of 100 fathoms of gillnet.	A limited commercial bait herring fishery has been under way in the Nome area during the past five weeks. There is a small market for bait herring to meet the needs of the king crab and halibut fisheries this summer. Several fishers have requested an opening so that they could meet this market. The Norton Sound herring harvest is well below 3,000 st and far from the estimated harvestable surplus of 8,000 st. There is no conservation concern with the expected additional herring harvest. Herring continue to migrate through the subdistrict, making them available to harvest. A market still exists for bait and the slow harvest rate is appropriate for facilitating freezing and storage in the existing facilities.
3-H-Z-11-98	July 15, 1998	This emergency order extends commercial herring gillnet fishing in Subdistrict 7 until 12:00 noon Wednesday, July 22. Each vessel may operate a maximum of 100 fathoms of gillnet.	A limited commercial bait herring fishery has been under way in the Nome area during the past six weeks. There is a small market for bait herring to meet the needs of the king crab and halibut fisheries this summer. Several fishers have requested an opening so that they could meet this market. The Norton Sound herring harvest is well below 3,000 st. and far from the estimated harvestable surplus of 8,000 st. There is no conservation concern with the expected additional herring harvest. Herring continue to migrate through the subdistrict, making them available to harvest. A market still exists for bait and the slow harvest rate is appropriate for facilitating freezing and storage in the existing facilities.

Appendix G3. Emergency Orders issued during 1998.

Emergency Order Number	Effective Date	Action Taken	Comments
3 -S-Z-1-98	June 15, 1998	This emergency order closes the Nome Subdistrict to subsistence salmon fishing in the Sinuk, Cripple, Penny, Snake, Nome, Flambeau, Eldorado, Bonanza, and Solomon Rivers. In addition, the waters of Safety Sound and Bonanza Channel inside the barrier spit and Safety Bridge, as well as ocean waters from the Cape Nome jetty west to the Sinuk River mouth are closed to salmon fishing from 6:00 p.m. June 15 through July 31.	For the past decade the chum salmon of the Nome Subdistrict have had weak returns. Although limited rebuilding has occurred the chum salmon returns are far weaker than those prior to 1987. Once again, the streams of the Nome Subdistrict are being closed to provide chum salmon spawning stock. Chum salmon are beginning to arrive in local waters at this time. The 1998 pink salmon return is expected to be strong. By closing chum salmon harvests now there will be less of a concern with the harvest of pink salmon in early July. Many streams in the Nome area have been judged to have adequate chum escapement levels in recent years. Subsistence fishing will reopen as pink or coho salmon become abundant and as chum salmon escapement goals are met. Various locations and streams will be judged individually and opened on the basis of their individual chum salmon escapement and pink or coho salmon abundance. The staff will be flying frequent aerial surveys and boating some of the rivers to track the salmon migration's strength and progress. The weir on the Nome River, and the counting towers on the Snake, and Eldorado rivers will also be used to track the various salmon migrations. If a stream appears to have adequate escapement, restrictions will be lifted in that area; otherwise, the restrictions will remain in place until they no longer benefit the species of concern. Subsistence fishers of the Nome Subdistrict are reminded of the regulatory changes that occurred in 1995. The first change is that a maximum of 50 fathoms of net may be used in saltwater and that only 50 feet of net may be used in freshwater. The fishing period in saltwater has been extended. The periods now begin 6:00 p.m. Monday and close 6:00 p.m. Saturday. Freshwater openings will continue to be the standard two 48 hour openings beginning at 6:00 p.m. on Mondays and Thursdays, once freshwater reopens.
3-S-Z-2-98	June 15, 1998	This emergency order opens the Shaktoolik, and Unalakleet Subdistricts to commercial king salmon fishing for a standard 24 hour period at 6:00 p.m. Monday, June 15. The fishing period will run from 6:00 p.m. Monday until 6:00 p.m. Tuesday. Only nets with a mesh size of seven and one-half inches or larger will be allowed.	Subsistence catch data and the Unalakleet sport fishery both indicate the salmon migration is now moving into the rivers. King salmon have been present in nearshore waters for at least ten days. Both king and chum salmon have been caught in the Unalakleet test net, three miles up river, for several days. The salmon migration is now well established. This opening is intended to test the abundance of salmon in the waters of eastern Norton Sound. Little king salmon escapement is thought to have occurred to date. A reduced fishing schedule will be in place until the king salmon escapement is thought to be adequate in the rivers flowing into the open commercial subdistricts. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-S-Z-3-98	June 18, 1998	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial king salmon fishing for a standard 24 hour period at 6:00 p.m. Thursday, June 18. The fishing period will run from 6:00 p.m. Thursday until 6:00 p.m. Friday. Only nets with a mesh size of seven and one-half inches or larger will be allowed.	The recent commercial fisheries opening and the Unalakleet River test net catches indicate the Norton Sound king salmon return is either slow or weak in the Unalakleet Subdistrict. The Shaktoolik harvest was near average for a first period opening. This is thought to indicate a delayed migration and that abundance will increase during this next opening. Both the Unalakleet test net and the Shaktoolik counting tower indicate low escapements at this time and so a reduced commercial harvest schedule is appropriate at this time. A second opening will be allowed to further test king salmon abundance but it will be held to 24 hours due to the poor showing during the first o ing at Unalakleet. If the harvest remains low during this period there ma no opening next week to allow escapements to rise. Commercial fishermen are re that unsold sa n caught in commercial gear must be reported on fish tickets.

Appendix C5. Emergency Orders issued during 1998.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-Z-4-98	June 18, 1998	This emergency order opens the Moses Point Subdistrict to commercial king salmon fishing for a standard 24 hour period at 12:00 noon Thursday, June 18. The fishing period will run from 12:00 noon Thursday until 12:00 noon Friday. Only nets with a mesh size of seven and one-half inches or larger will be allowed.	Recent subsistence catches indicate the presence of king salmon in the Moses Point Subdistrict for the past 10 days. The commercial opening earlier this week at Shaktoolik indicates salmon entering that subdistrict from the waters offshore of Moses Point. The department staff believes there is a small harvestable surplus of king salmon bound for the rivers of the Moses Point Subdistrict. Past experience has shown these fish blush quickly in the low salinity of inner Norton Sound and so a commercial opening should be held soon to maximize the value of the harvest. Only one king salmon directed opening is anticipated for this subdistrict. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-S-Z-5-98	June 25, 1998	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial king salmon fishing for a standard 24 hour period at 6:00 p.m. Thursday, June 25. The fishing period will run from 6:00 p.m. Thursday until 6:00 p.m. Friday. Only nets with a mesh size of seven and one-half inches or larger will be allowed.	The recent Unalakleet River test net catches indicate the Norton Sound king salmon escapement has recovered well in the last several days. The Shaktoolik and Unalakleet subsistence harvests have apparently satisfied many fishers, since they have removed their nets from the water and are no longer fishing. The king salmon migration is now roughly at the half-way point. The recent escapement trend is very strong and if the trend continues the fishing period may be extended. The king salmon market will likely be reduced as pink salmon become abundant and that season opens. The harvest shift will help to boost escapements during the later portion of the king salmon migration. With escapements at a level consistent with the run timing, commercial openings are returning to a normal schedule. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-S-Z-6-98	June 28, 1998	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial pink salmon fishing for a 12-hour period at 6:00 a.m. Sunday, June 28. The fishing period will run from 6:00 a.m. until 6:00 p.m. Sunday. Only nets with a mesh size of four to four and one-half inches will be allowed.	The recent Unalakleet River test net catches indicate the Norton Sound king and chum salmon escapements are normal for this point in the season. No conservation problems are anticipated at this time with salmon management in these subdistricts. A salmon buyer has expressed an interest in a large number of pink salmon. Even year returns of pink salmon are generally strong in Norton Sound. The most likely limiting factor in pink salmon harvest is a limited fishing fleet. This opening is intended to test the abundance of pink and chum salmon. It is the staff's intent to open the pink salmon commercial fishery as soon as the pink to chum ratio is such that chum wastage is not a problem. The value of the pink fishery increases on a price per pound basis with an increase in harvest above one million fish and increments above that. The buyer has made the point that the economic viability of the fishery is dependent on the harvest of at least one million pink salmon. The earliest possible openings will be required to facilitate reaching this fishery's fullest potential.
3-S-Z-7-98	June 26, 1998	This emergency order extends the current fishing period in the Unalakleet Subdistrict to commercial king salmon fishing for another 24 hours to 6:00 p.m. Saturday, June 27. The extension does not include the Shaktoolik Subdistrict. Only nets with a mesh size of seven and one-half inches or larger will be allowed.	The recent Unalakleet River test net catches and North River tower counts indicate the Unalakleet River king salmon escapement has recovered well in the last several days. The Unalakleet subsistence harvests have apparently satisfied many fishers, since they have removed their nets from the water and are no longer fishing. The Shaktoolik River escapements have not shown an upturn in king salmon escapement. Escapement there is well below that experienced during the last two years. There is no reason to believe the apparent poor return at Shaktoolik is due to a poor parent year class or that river condition has delayed migration. It does appear, heavier subsistence fishing may have affected escapement there. The Shaktoolik king salmon escapement will continued to be monitored in order to provide escapements for future salmon production.

Appendix G3. Emergency Orders issued during 1998.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-Z-8-98	June 29, 1998	This emergency order opens the Unalakleet Subdistrict to commercial king salmon or pink salmon fishing for 48 hours beginning 6:00 p.m. Monday, June 29. The opening does not include the Shaktoolik Subdistrict. Only nets with a mesh size of seven and one-half inches and larger or nets with a mesh size of four and one-half inches and smaller will be allowed. Permitees are allowed 100 fathoms of net, whether it is all the same size or a shackle each of the two choices.	The recent Unalakleet River test net catches and North River tower counts indicate the Unalakleet River king salmon escapement has remained near average during the last several days. The Unalakleet subsistence harvests have apparently satisfied many fishers, since they have removed their nets from the water and are no longer fishing. The Shaktoolik River escapements have begun to show an upturn in king salmon escapement; however, escapement there is well below that experienced during the last two years. King salmon escapement is so far behind the previous years' indices that further king salmon directed openings are unlikely this year in the Shaktoolik Subdistrict.
3-S-Z-9-98	June 29, 1998	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial pink salmon fishing from 6:00 p.m. Monday, June 29 until 6:00 p.m. Saturday, July 25. The fishing periods will be determined by the pink salmon buyer until the pink salmon season closes. Only nets with a mesh size of four to four and one-half inches will be allowed.	The pink salmon opening which occurred on Sunday found pink salmon catches were 70 times that of chum in four-inch mesh. King salmon incidental harvests were similar. This rate of incidental harvest does not represent conservation concern for either of these salmon. A salmon buyer has expressed an interest in a large number of pink salmon. Even year returns of pink salmon are generally strong in Norton Sound. The most likely limiting factor in pink salmon harvest is a limited fishing fleet. By opening now it is the staff's intent to maximize the pink salmon commercial fishery's harvest potential. The value of the pink fishery increases on a price per pound basis with an increase in harvest above one million fish and increments above that. The buyer has made the point that the economic viability of the fishery is dependent on the harvest of at least one million pink salmon. The early opening is required to facilitate reaching this fishery's fullest potential.

Appendix C3. Emergency Orders issued during 1998.

Emergency Order Number	Effective Date	Action Taken	Comments
3 -S-Z-10-98	June 29, 1998	This emergency order opens the marine waters from Cape Nome to the Sinuk River Mouth to subsistence gillnet fishing using nets with only four inch to four and one-half inch mesh. The closures of the freshwater and Safety Sound Areas remain in place. Subsistence fishers are reminded they are required to obtain a permit for the marine water area now opening.	Pink salmon have begun to appear at the mouths of local rivers. Although a few chum salmon are also being caught, pink salmon far outnumber the chum salmon. By restricting the subsistence fishery west of Cape Nome to small mesh nets, the harvest of chum salmon will be minimized. Harvests using small mesh gear in Eastern Norton Sound on Sunday June 28 were composed of roughly 100 pinks for each chum salmon. This strategy of using small nets is intended to allow the full utilization of the pink salmon while only a small harvest of chum salmon occurs. This new strategy will concentrate the harvest on pink salmon at times when they can be best utilized so chum salmon can still recover. Chum Salmon the streams west of Cape Nome have recovered partially since the low returns of 1989 and 1990. Escapements have been adequate for the last two years in the Nome and Snake Rivers but there was no chum salmon for human use. It is hoped this opening will allow fishing to occur at more traditional times and places than have been allowed in the last eight years. Subsistence fishers are reminded that nets of the improper size found fishing may be confiscated along with the catch and equipment used to tend the net. Mesh size restrictions of this nature have worked well in eastern Norton Sound for years. This sort of directed fishery allows fishing to occur over a longer season and with larger catches than would otherwise occur. If this strategy can be successfully used here in Nome much of the shortages reported over the past several years can be avoided. The staff will be flying frequent aerial surveys and boating some of the rivers to track the salmon migration's strength and progress. The weir on the Nome River, and the counting towers on the Snake, and Eldorado rivers are currently being set-up and will also be used to track the various salmon migrations. If a stream appears to have adequate escapement, restrictions will be lifted in that area: otherwise, the restrictions will remain in place until they no longer benefit the species of concern.
3-S-Z-11-98	June 30, 1998	This emergency order opens the Moses Point Subdistrict to commercial pink salmon fishing from 10:00 a.m. Tuesday, June 30 until 6:00 p.m. Saturday, July 25. The fishing periods will be determined by the pink salmon buyer until the pink salmon season closes. Only nets with a mesh size of four to four and one-half inches will be allowed.	The pink salmon openings which occurred on Sunday and Monday in Unalakleet and Shaktoolik found pink salmon catches were at least 70 times that of chum in four inch mesh. The rate of king salmon incidental harvests were similar. This rate of incidental harvest does not represent a conservation concern for either of these salmon. A salmon buyer has expressed an interest in a large number of pink salmon. Even year returns of pink salmon are generally strong in Norton Sound. The most likely limiting factor in pink salmon harvest is a limited fishing fleet. The community of Elim has expressed an interest in participating in the pink salmon fishery. The buyer has expressed their ability to accept fish and tender from that subdistrict. By opening now it is the staff's intent to maximize the pink salmon commercial fishery's harvest potential. Not only is the quantity affected by earlier openings, but the quality of salmon caught early in the migration produces a higher yielding product. The value of the pink fishery increases on a price per pound basis with an increase in harvest above one million fish and increments above that. The buyer has made the point that the economic viability of the fishery is dependent on the harvest of at least one million pink salmon. The early opening is required to facilitate reaching this fishery's fullest potential.

Appendix G3. Emergency Orders issued during 1998.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-Z-12-98	July 2, 1998	This emergency order opens the Unalakleet Subdistrict to commercial king salmon fishing for 24 hours beginning 6:00 p.m. Thursday, July 2. The opening does not include the Shaktoolik Subdistrict. Only nets with a mesh size of seven and one-half inches and larger or nets with a mesh size of four and one-half inches and smaller will be allowed. Permitees are allowed 100 fathoms of net, whether it is all the same size or a shackle each of the two choices.	The recent Unalakleet River test net catches and North River tower counts indicate the Unalakleet River king salmon escapement has peaked and the escapement is beginning to fall behind the levels required to sustain the typical level of harvest. The Shaktoolik and Kwiniuk River king salmon escapements are well below the levels needed to sustain those fisheries. King salmon abundance in marine waters appears to be on the decline. The numbers of king salmon entering the Unalakleet are likely to continue to decline for the remainder of the season. This reduction in harvest is intended to bolster the king salmon escapement in the Unalakleet River.
3 -S-Z-13-9	July 9, 1998	This emergency order opens the marine waters of Safety Sound and Bonanza Channel east of the Safety Bridge to subsistence gillnet fishing using nets with only four inch to four and one-half inch mesh. This emergency order also opens the Bonanza and Cripple Rivers and the those portions of the Sinuk, Nome, and Solomon Rivers below the regulatory markers to the seining of salmon with the requirement that all chum salmon be released. The closures of the western half of Safety Sound and the Penny, Snake, Eldorado and Flambeau Rivers remains in effect.	Pink salmon are now in high abundance in the mouths of most rivers in the Nome area. Pink salmon returns are roughly the same as their parent year return, which was the fourth largest since statehood. Unfortunately, the chum salmon return is well below expectations. The recent small gear opening in marine waters has successfully allowed a predominantly pink salmon harvest in marine waters. This emergency order will now allow an equivalent opportunity in freshwater. Fishers are required to return chums caught in seine nets to the water. The staff is still watching the chum salmon escapement indices and plan to open if the chum return strengthens in the near future. Salmon returns throughout the Bering Sea have been late. The chum returns in the Moses Point and Golovin Bay areas have been encouraging. The local Nome chum returns may just be late. Subsistence fishers are encouraged to call or visit the Nome Fish and Game office to clarify areas open to fishing. We can be reached at 443-5167 and we have a map available. The staff will be flying frequent aerial surveys and boating some of the rivers to track the salmon migration's strength and progress. The weir on the Nome River, and the counting towers on the Snake, and Eldorado rivers are currently up and running and will also be used to track the various salmon migrations. If a stream appears to have adequate escapement, restrictions will be lifted in that area; otherwise, the restrictions will remain in place until they no longer benefit chum salmon.
3 -S-Z-14-98	July 9, 1998	This emergency order opens the marine waters of Safety Sound and Bonanza Channel to subsistence gillnet fishing using nets with only four inch to four and one-half inch mesh. This emergency order also opens the Eldorado and Flambeau Rivers to the seining of salmon with the requirement that all chum salmon be released. The closure of the Penny and Snake Rivers remains in effect.	A boat survey of the Eldorado River today found large numbers of pink salmon in the lower Eldorado and Flambeau Rivers. The fish were just moving into clear water and were in most of the favorite fishing holes. Some chum and king salmon were also observed. The number of chum salmon are still thought to be low. Fish counters will be working at getting a better count on chum salmon during the next couple days. Subsistence fishers are encouraged to call or visit the Nome Fish and Game office to clarify areas open to fishing. We can be reached at 443-5167 and we have a map available. The staff will be flying frequent aerial surveys and boating some of the rivers to track the salmon migration's strength and progress. The weir on the Nome River, and the counting towers on the Snake, and Eldorado rivers are currently up and running and will also be used to track the various salmon migrations. If a stream appears to have adequate escapement, restrictions will be lifted in that area; otherwise, the restrictions will remain in place until they no longer benefit chum salmon.

Appendix G5. Emergency Orders issued during 1998.

Emergency Order Number	Effective Date	Action Taken	Comments
3 -S-Z-15-98	July 17, 1998	This emergency order extends the Moses Point Subdistrict western boundary to the terminus of Canyon Creek near Portage Roadhouse.	Commercial fishermen in the Moses Point Subdistrict have requested the western boundary be relaxed to improve quality and provide a greater opportunity for pink salmon harvest. Pink salmon escapement is strong in the subdistrict. No conservation problems are anticipated from this extension of the fishery.
3-S-Z-16-98	July 19, 1998	This emergency order opens the Golovin Bay Subdistrict to commercial pink salmon fishing from 9:00 a.m. Sunday, July 19 until 6:00 p.m. Friday, July 31. The fishing periods will be determined by the pink salmon buyer until the pink salmon season closes. Only nets with a mesh size of four to four and one-half inches will be allowed.	A salmon buyer has expressed an interest in a large number of pink salmon. Even year returns of pink salmon are generally strong in Norton Sound. The most likely limiting factor in pink salmon harvest is a limited fishing fleet. The commercial fishermen from Golovin and other communities have expressed an interest in participating in a pink salmon fishery in Golovin Bay. A large number of pink salmon have been spotted by air in the bay. The buyer has expressed their ability to accept fish and tender from that subdistrict. By opening now it is the staff's intent to maximize the pink salmon commercial fishery's harvest potential. The escapement indices of the salmon streams in the subdistrict indicate ther are no conservation issues at this time. By opening the subdistrict, this fishery's fullest potential is more likely to be reached.
3 -S-Z-17-98	July 22, 1998	This emergency order opens Snake River to gillnet fishing below the counting tower, with no mesh size restrictions. The closure of the Penny River remains in effect.	The chum salmon escapement has more than doubled during the past week. Both the counting tower and the aerial survey index indicate adequate salmon escapements in the Snake River. No other stream in the subdistrict has adequate chum salmon escapements at this time. Subsistence fishers are reminded that gill nets in freshwater are limited to 50 feet and that freshwater subsistence openings run from 6:00 p.m. Monday to 6:00 p.m. Wednesday and from 6:00 p.m. Thursday to 6:00 p.m. Saturday.
3-S-Z-18-98	July 27, 1998	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial silver salmon fishing for a 24-hour test period at 6:00 p.m. Monday, July 27. The fishing period will run from 6:00 p.m. Monday until 6:00 p.m. Tuesday.	Subsistence catch data and the Unalakleet sport fishery both indicate the silver salmon migration is now moving into the rivers. Silver salmon have been noted in nearshore waters for at least ten days. However, chum salmon are in short supply. The commercial harvests of chum salmon have been only from the incidental take in the pink and king salmon fisheries. Yet the escapement of chum salmon in the eastern Norton Sound streams are less than half the long-term average. This opening is intended to test the abundance of coho salmon in relation to the abundance of chum salmon in eastern Norton Sound. The period length will be extended when the harvest is predominantly coho salmon. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3 -S-Z-19-98	July 30, 1998	This emergency order opens the rivers east of Cape Nome to gillnet fishing, with no mesh size restrictions. The closure of the Solomon River upstream of the no fishing sign remains in effect.	The chum salmon escapements in the streams east of Cape Nome are approaching or have exceeded their escapement goals. Both the counting tower and the aerial survey indices indicate adequate salmon escapements in the Eldorado River. The near by streams are thought to have similar escapement trends. Subsistence fishers are reminded that gill nets in freshwater are limited to 50 feet and that freshwater subsistence openings run from 6:00 p.m. Monday to 6:00 p.m. Wednesday and from 6:00 p.m. Thursday to 6:00 p.m. Saturday.

Appendix G3. Emergency Orders issued during 1998.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-Z-20-98	July 27, 1998	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial silver salmon fishing for the standard fishing schedule of two 48-hour periods per week beginning at 6:00 p.m. Thursday, July 30. The fishing periods will run from 6:00 p.m. Monday until 6:00 p.m. Wednesday and from 6:00 p.m. Thursday until 6:00 p.m. Saturday.	The recent commercial opening indicates the silver salmon migration is of average strength in the rivers of eastern Norton Sound. Silver salmon predominate in the catch over chum salmon. There is little to be done now to build up the poor chum salmon return of this season. The staff will continue to monitor the silver salmon return to these subdistricts in order to assess the return as it develops. The early indicators of silver salmon run strength are just average. The parent year, 1994, brood stock was well above average. We are very interested in how this return develops. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-S-Z-21-98	July 30, 1998	This emergency order closes the Nome Subdistrict to commercial salmon fishing.	The rivers of the Nome Subdistrict have limited returns of most salmon species. Only the pink salmon returns on even years are assured to be sufficient to provide for the needs of subsistence, commercial, and sport users. The pink salmon return is now declining and silver salmon are beginning their migration into fresh water. The strength of the silver salmon return the local streams is not known at this time. Until the return is found to be of average or better strength no commercial openings will be allowed in the Nome Subdistrict.
3-S-Z-22-98	August 1, 1998	This emergency order opens the Golovnin Bay Subdistrict to commercial salmon fishing for a 24-hour period beginning at 6:00 p.m. Saturday, August 1.	A fisherman has requested to have an opening in Golovnin Bay Subdistrict to meet his market. He has a limited need for only his harvest. The salmon stocks of the subdistrict are sufficient to meet escapement goals. The pink salmon return is large, the chum salmon return is sufficient to meet the goal on the Fish River system, and the King salmon return is above average. The coho salmon return is just entering freshwater at this time and the return strength is unknown. Since the fisherman has a small demand for his harvest there is not a conservation concern anticipated as a result of this opening. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-S-Z-23-98	August 3, 1998	This emergency order opens the marine waters and the rivers west of Cape Nome to gillnet fishing, with no mesh size restrictions. The closure of the Sinuk and Nome Rivers upstream of the no fishing sign and at the Nome River mouth remains in effect. Chum salmon caught in beach seines must be returned to the water.	The chum salmon migration into the streams of the Nome Subdistrict is essentially over. Silver salmon are now entering fresh water with increasing numbers. Pink salmon are still available for a short time, but many are dying and will frustrate fishers for the next week. This emergency order marks the transition from chum and pink salmon management to silver salmon management. At this time the silver salmon return appears average. It is still early in the run and the staff is monitoring the escapement to make a further assessment of the return. Subsistence fishers are reminded that gill nets in freshwater are limited to 50 feet and that freshwater subsistence openings run from 6:00 p.m. Monday to 6:00 p.m. Wednesday and from 6:00 p.m. Thursday to 6:00 p.m. Saturday.

Appendix . . . Emergency Orders issued during 1998.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-Z-24-98	August 3, 1998	This emergency order opens the Moses Point and Norton Bay Subdistricts to commercial salmon fishing for a 24-hour period beginning at 6:00 p.m. Monday, August 3.	Fishermen have requested to open a fishery in the Moses Point and Norton Bay Subdistricts. The local salmon buyer has expressed their willingness to purchase salmon in those subdistricts to test quality and quantity. The tender will stop at Moses Point and Isaac's Point. The earlier salmon returns in both subdistricts have been generally good. Silver salmon returns are not evaluated in these subdistricts yet. This opening is intended to test silver salmon run strength and harvest quality. The possibility of future openings will be evaluated on the basis of the success of this opening. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-S-Z-25-98	August 5, 1998	This emergency order opens the Golovin Bay Subdistrict to commercial salmon fishing for a 24-hour period beginning at 6:00 p.m. Wednesday, August 5.	A fisherman has requested to have an opening in Golovin Bay Subdistrict to meet his market. He has a limited need for only his harvest and he was unable to fish during the last opening due to rough weather. The salmon stocks of the subdistrict are sufficient to meet escapement goals. The pink salmon return is large, the chum salmon return is sufficient to meet the goal on the Fish River system, and the king salmon return is above average. The coho salmon return is just entering freshwater at this time and the return strength appears to be normal at this time. Since the fisherman has a small demand for his harvest there is not a conservation concern anticipated as a result of this opening. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-S-Z-26-98	August 5, 1998	This emergency order opens the Moses Point and Norton Bay Subdistricts to commercial salmon fishing for a 24-hour period beginning at 6:00 p.m. Wednesday, August 5.	Fishermen have requested a fishery to be opened in the Moses Point and Norton Bay Subdistricts. No fishing occurred on the opening Monday evening due to poor weather. The local salmon buyer has expressed their willingness to purchase salmon in those subdistricts to test quality and quantity. The tender will stop at Moses Point and Isaac's Point. The earlier salmon returns in both subdistricts have been generally good. Silver salmon returns are not evaluated in these subdistricts yet. This opening is intended to test silver salmon run strength and harvest quality. The possibility of future openings will be evaluated on the basis of the success of this opening. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-S-Z-27-98	August 7, 1998	This emergency order opens the Moses Point and Norton Bay Subdistricts to commercial salmon fishing for a 24-hour period beginning at 6:00 p.m. Friday, August 7.	Fishermen have requested a coho salmon directed fishing period to be opened in the Moses Point and Norton Bay Subdistricts. The local salmon buyer has affirmed their willingness to purchase salmon in those subdistricts as long as the quality and quantity of coho salmon remains good. A tender is planned to stop at both Moses Point and Isaac's Point. The previous fishing period in the Moses Point Subdistrict produced an acceptable harvest and catch rate with minimal effort. The coho return is believed to be in its early stages and is judged to be near normal so far. This period is intended to further test the coho salmon run strength. The possibility of future openings will be evaluated on the basis of the success of this period. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.

Appendix G3. Emergency Orders issued during 1998.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-Z-28-98	August 10, 1998	This emergency order opens the Moses Point and Norton Bay Subdistricts to commercial salmon fishing for two 24-hour periods beginning at 6:00 p.m. Monday, August 10 and at 6:00 p.m. Thursday, August 13. The periods will run from 6:00 p.m. ADT Monday until 6:00 p.m. ADT Tuesday and from 6:00 p.m. ADT Thursday until 6:00 p.m. ADT Friday.	Fishermen have requested a fishery to be opened in the Moses Point and Norton Bay Subdistricts. The local salmon buyer has expressed their willingness to purchase salmon in those subdistricts to test quality and quantity. The earlier salmon returns in both subdistricts have been generally good. Silver salmon returns are judged to be average on the basis of catch rates in the Moses Point Subdistrict. These openings will be used to further evaluate silver salmon run strength and harvest quality. The possibility of future openings will be evaluated on the basis of the success of these two openings. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-S-Z-29-98	August 17, 1998	This emergency order opens the Golovin Bay, Moses Point, Norton Bay and Shaktoolik Subdistricts to commercial salmon fishing from 6:00 p.m. Monday, August 17 until 6:00 p.m. Monday, August 31. The buyer will set the actual fishing time. The Unalakleet Subdistrict will remain on the standard fishing schedule until 6:00 p.m. September 5. The periods at Unalakleet will run from 6:00 p.m. ADT Monday until 6:00 p.m. ADT Wednesday and from 6:00 p.m. ADT Thursday until 6:00 p.m. ADT Saturday.	The poor weather over the past ten days has not allowed the tender to travel to the fishing subdistricts north of Shaktoolik and Unalakleet. Shaktoolik has run short on fuel and the weather there has been exceptionally rough. Outside of the Unalakleet Subdistrict, there has been no commercial fishing for the past week. Fishing has occurred in the Unalakleet Subdistrict at a lower rate than usual. The silver salmon escapement indices have shown below average passage in the Unalakleet River. The rate of harvest at Unalakleet has been appropriate for the below average return this season so the fishing schedule there will remain unchanged. The schedule in the other subdistricts will be at the discretion of the buyer so that fishing can be allowed when possible. The peak of the silver salmon escapement has now past and most subdistricts are well below their normal harvests at this time. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-S-X-1-98	July 9, 1998	This emergency order opens the Kotzebue District to two 12 hour openings. The first opening will begin at 6:00 a.m. Thursday, July 9 and end at 6:00 p.m. Thursday, July 9. The second opening will begin at 6:00 a.m. Friday, July 10 and end at 6:00 p.m. Friday, July 10.	In keeping with the management plan published prior to the season, the commercial fishery will open July 9. With only one buyer and a limited market, openings will be shorter but more frequent. This will allow a better product as all salmon sold are iced whole and flown out. The most reliable index of chum salmon run strength is the commercial catch rate. Management using comparisons of catch rate trends will not be possible with the shorter, more frequent openings. Age composition, test fisheries and subsistence reports will be a factor in management decisions as periods are shortened. With an average return expected, a limited market and a reduced number of participating fishermen, achieving escapement goals is not expected to be a problem.
3-S-X-2-98	July 13, 1998	This emergency order opens the Kotzebue District to two 12 hour openings. The first opening will begin at 6:00 a.m. Monday, July 13 and end at 6:00 p.m. Monday July 13. The second opening will begin at 6:00 a.m. Tuesday, July 14 and end at 6:00 p.m. Tuesday, July 14.	Because of the demand for a better product the buyer has requested shorter but more frequent openings. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long term average are complicated by the shorter, more frequent openings and very limited participation. When the first two 12 hour fishing periods are combined the catch rate per fisherman was above the long term average and slightly below that of 1997. Age composition, test fisheries, and subsistence reports will be factors in management decisions [illegible] periods are shortened. With an average return expected, a limited marke[illegible]d a reduced [illegible]r of participating fishermen, achieving escapement goals is not expec[illegible]e a problem.

Appendix C3. Emergency Orders issued during 1998.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-X-3-98	July 16, 1998	This emergency order opens the Kotzebue District to two 12 hour openings. The first opening will begin at 6:00 a.m. Thursday, July 16 and end at 6:00 p.m. Thursday July 16. The second opening will begin at 6:00 a.m. Friday, July 17 and end at 6:00 p.m. Friday, July 17.	Because of the demand for a better product the buyer has requested shorter but more frequent openings. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long term average are complicated by the shorter, more frequent openings and very limited participation. When the first four 12 hour fishing periods are combined the catch rate per fisherman was above the long term average and of 1997. Age composition, test fisheries, and subsistence reports will be factors in management decisions as periods are shortened. With an average return expected, a limited market and a reduced number of participating fishermen, achieving escapement goals is not expected to be a problem.
3-S-X-4-98	July 20, 1998	This emergency order opens the Kotzebue District to two 12 hour openings. The first opening will begin at 6:00 a.m. Monday, July 20 and end at 6:00 p.m. Monday July 20. The second opening will begin at 6:00 a.m. Tuesday, July 21 and end at 6:00 p.m. Tuesday, July 17.	Because of the demand for a better product the buyer has requested shorter but more frequent openings. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long term average are complicated by the shorter, more frequent openings and very limited participation. When the last two 12 hour fishing periods are combined for comparison purposes the catch rate per fisherman was above the long term average but below that for 1997. Adverse weather conditions on July 17 affected the effort with only 5 five fishermen making deliveries. Age composition, test fisheries, and subsistence reports will be factors in management decisions as periods are shortened. Test fish catches on the Kobuk River are above average for this date with the exception of the record of 1996. With an average return expected, a limited market and a reduced number of participating fishermen, achieving escapement goals is not expected to be a problem.
3-S-X-5-98	July 23, 1998	This emergency order opens the Kotzebue District to two 12 hour openings. The first opening will begin at 6:00 a.m. Thursday, July 23 and end at 6:00 p.m. Thursday July 23. The second opening will begin at 6:00 a.m. Friday, July 24 and end at 6:00 p.m. Friday, July 24.	Because of the demand for a better product the buyer has requested shorter but more frequent openings. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long term average are complicated by the shorter, more frequent openings and very limited participation. When the last two 12 hour fishing periods are combined for comparison purposes the catch rate per fisherman was above the long term average and that of 1997. Age composition, test fisheries, and subsistence reports will be factors in management decisions as periods are shortened. Test fish catches on the Kobuk River are above average for this date with the exception of the record of 1996. With an average return expected, a limited market and a reduced number of participating fishermen, achieving escapement goals is not expected to be a problem.

Appendix G3. Emergency Orders issued during 1998.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-X-6-98	July 27, 1998	This emergency order opens the Kotzebue District to five 12-hour openings. The openings will be from Monday, July 27 through Friday July 31, beginning at 6:00 a.m. and ending at 6:00 p.m. each day.	Because of the demand for a better product the buyer has requested shorter but more frequent openings. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long-term average are complicated by the shorter, more frequent openings and very limited participation. When the last two 12 hour fishing periods are combined for comparison purposes the catch rate per fisherman was above the long-term average and that of 1997. Age composition, test fisheries, and subsistence reports will be factors in management decisions as periods are shortened. Test fish catches on the Kobuk River are above average for this date with the exception of the record of 1996. With an average return expected, a limited market and a reduced number of participating fishermen, achieving escapement goals is not expected to be a problem.
3-S-X-7-98	August 3, 1998	This emergency order opens the Kotzebue District to five 12-hour openings. The openings will be from Monday, August 3 through Friday August 7, beginning at 6:00 a.m. and ending at 6:00 p.m. each day.	Because of the demand for a better product the buyer has requested shorter but more frequent openings. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long-term average are complicated by the shorter, more frequent openings and very limited participation. When the 12-hour fishing periods are combined for comparison purposes the catch rate per fisherman was above the long-term average and that of 1997. Age composition, test fisheries, and subsistence reports will be factors in management decisions as periods are shortened. Test fish catches on the Kobuk River are above average for this date with the exception of the record of 1996. With an average return expected, a limited market and a reduced number of participating fishermen, achieving escapement goals is not expected to be a problem.
3-S-X-8-98	August 10, 1998	This emergency order opens the Kotzebue District to two 12-hour openings. The first opening will begin at 6:00 a.m. Monday, August 10 and end at 6:00 p.m. Monday August 10. The second opening will began at 6:00 a.m. Tuesday, August 11 and end at 6:00 p.m. Tuesday, August 11.	Because of the demand for a better product the buyer has requested shorter but more frequent openings. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long-term average are complicated by the shorter, more frequent openings and very limited participation. When the 12-hour fishing periods are combined for comparison purposes the catch rate per fisherman was below the long-term average and that of 1997. Age composition, test fisheries, and subsistence reports will be factors in management decisions as periods are shortened. Test fish catches on the Kobuk River are below average for this date and are being monitored carefully. The return is lower than expected but with a limited market and a reduced number of participating fishermen, a limited harvest is available.
3-S-X-9-98	August 13, 1998	This emergency order opens the Kotzebue District to two 12-hour openings. The first opening will begin at 6:00 a.m. Thursday, August 13 and end at 6:00 p.m. Thursday August 13. The second opening will began at 6:00 a.m. Friday, August 14 and end at 6:00 p.m. Friday, August 14.	Because of the demand for a better product the buyer has requested shorter but more frequent openings. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long-term average are complicated by the shorter, more frequent openings and very limited participation. When the 12-hour fishing periods are combined for comparison purposes the catch rate per fisherman was below the long-term average and that of 1997. Age composition, test fisheries, and subsistence reports will be factors in management decisions as periods are shortened. Test fish catches on the Kobuk River are below average for this date and being monitored carefully. The return is lower than expected but with a limited market and a reduced number of participating fishermen, a limited harvest is available.

Appendix C5. Emergency Orders issued during 1998.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-X-10-98	August 17, 1998	This emergency order opens the Kotzebue District to two 12-hour openings. The first opening will begin at 6:00 a.m. Monday, August 17 and end at 6:00 p.m. Monday August 17. The second opening will began at 6:00 a.m. Tuesday, August 18 and end at 6:00 p.m. Tuesday, August 18.	Because of the demand for a better product the buyer has requested shorter but more frequent openings. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long-term average are complicated by the shorter, more frequent openings and very limited participation. When the 12-hour fishing periods are combined for comparison purposes the catch rate per fisherman was above the long-term average and that of 1997. Age composition, test fisheries, and subsistence reports will be factors in management decisions. Test fish catches on the Kobuk River are below average for this date and are being monitored carefully. The return is lower than expected but with a limited market and a reduced number of participating fishermen, a limited harvest is available.
3-S-X-11-98	August 20, 1998	This emergency order opens the Kotzebue District to two 12-hour openings. The first opening will begin at 6:00 a.m. Thursday, August 20 and end at 6:00 p.m. Thursday August 20. The second opening will begin at 6:00 a.m. Friday, August 21 and end at 6:00 p.m. Friday, August 21.	Because of the demand for a better product the buyer has requested shorter but more frequent openings. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long-term average are complicated by the shorter, more frequent openings and very limited participation. When the 12-hour fishing periods are combined for comparison purposes the catch rate per fisherman for the last period was not meaningful due to the weather. The age composition from test fisheries on the Noatak River showed a lower incidence of 5-year-old chum salmon than recent years. Test fish catches on the Kobuk River were below average for the season. The return is lower than expected but with a limited market and a reduced number of participating fishermen, a limited harvest is available.

Appendix G4. Norton Sound, Port Clarence, Kotzebue Sound processors and associated data, 1998.

Company	Address	Type of Processing	District
Aqua Tech	P.O. Box 10119 Anchorage, AK 99510	Fresh Crab	Norton Sound
Glacier Fish Co.	1200 West Lake Ave Suite 900 Seattle, WA 98109	Frozen Salmon	Norton Sound
New West Fisheries	601 West Chestnut Bellingham, WA 98225	Frozen Herring	Norton Sound
Nome Fish Co	Nome	Fresh/cooked Crab	Norton Sound
Norton Sound Seafood	Unalakleet	Frozen/Fresh Salmon	Norton Sound
North Alaska Fisheries	Kotzebue	Fresh Salmon	Kotzebue
Yard Arm Knot	3600 15th Ave. W. Suite #300 Seattle, WA 98119	Frozen Herring	Norton Sound

Appendix Table G5.

COMMUNITY ID# _____
HHID#_____

NORTON SOUND AND SEWARD PENINSULA AREA

1998 SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY

* Questions marked with an asterisk are asked of all households interviewed

Community: _____ Household Head Name: _____

Survey Date: _____ ***Household Size** _____

Interviewer:_____ Was household in community last year? No ___Yes____

If no, where were you living? _____

Household P.O. Box (if new): _____

***1. Did your household catch salmon for subsistence use or with a rod-and-reel this year?**
No_____ Yes_____

***2. Does your household usually subsistence fish for salmon?** No_____ Yes_____

FISHING HOUSEHOLDS ("Yes" to #1)

3. Please estimate how many salmon your household caught for subsistence use or with a rod-and-reel this year (your share of the catch if fishing with others). Include salmon you gave away, ate fresh, lost to spoilage, or obtained from helping others process fish.

CHUM_____ ("DOGS") CHINOOK_____ ("KINGS") PINK_____ ("HUMPIES") SOCKEYE _____ ("REDS") COHO_____ ("SILVERS") UNKNOWN SALMON_____

4. What type(s) of fishing gear did your household use for catching subsistence salmon this year?

SET GILL NET _____ SEINE _____
ROD-AND-REEL _____ DRIFT GILL NET _____

4a. How many salmon did your household catch and keep with rod-and-reel this year?

CHUM_____ ("DOGS") CHINOOK_____ ("KINGS") PINK_____ ("HUMPIES") SOCKEYE _____ ("REDS") COHO_____ ("SILVERS")

5. Did your household give salmon to other households this year? No _____ Yes _____

6. How was subsistence **chum** salmon fishing for your household this year?
____VERY GOOD _____AVERAGE _____POOR IF POOR, WHY?_____

7. Did your household catch salmon for dog food? (Using salmon for dog food is allowed by regulations.)
No ____ (Go to #13) Only backbones/heads/guts/scraps/spoiled fish ____ (Go to #13) Yes _____(Go to #8)

8. How many salmon did your household catch for dog food? (Do not include fish lost to spoilage and fed to dogs.)

CHUM_____ ("DOGS") CHINOOK_____ ("KINGS") PINK_____ ("HUMPIES") SOCKEYE _____ ("REDS") COHO_____ ("SILVERS") UNKNOWN SALMON_____

9. Were these salmon included in the estimates you already gave me? No_____ Yes _____

10. How many dogs does your household have? _____ (Go to #13)

Appendix Table G5.

HH ID#_____

NORTON SOUND AND SEWARD PENINSULA AREA

1998 SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY (CON'T)

NON-FISHING HOUSEHOLDS ("No" to #1)

11. Did your household help another household fish, cut or hang salmon, or process it some other way? No_____(Go to #13)
Yes _____

12. Did you receive salmon in exchange for your help? No ____ Yes ____

If yes, please estimate how many salmon you received for your household. (Do not include fish from a F&G test net.)

CHUM_____ ("DOGS") CHINOOK_____ ("KINGS") PINK_____ ("HUMPIES") SOCKEYE _____ ("REDS") COHO_____ ("SILVERS") UNKNOWN SALMON_____

(Go to #13)

COMMERCIAL FISHING

***13. Did your household commercially fish for salmon this year?** No _____ (Go to #17) Yes _____

If yes, where?_____

14. Were all of the salmon you caught when commercial fishing sold or were some brought home to eat or processed for subsistence? All sold _____ (Go to #17) Some used for subsistence _____

15. How many commercially caught salmon did your household use for subsistence?

CHUM_____ ("DOGS") CHINOOK_____ ("KINGS") PINK_____ ("HUMPIES") SOCKEYE _____ ("REDS") COHO_____ ("SILVERS") UNKNOWN SALMON_____

16. Were these salmon included in the estimates you already gave me? No _____ Yes _____

***17. Do you have any suggestions or concerns about subsistence fishing?**

THANK YOU FOR YOUR TIME AND FOR HELPING WITH THIS PROJECT.

A summary of this subsistence fishing survey will be sent to you next spring (April).

Appendix Table G6 .

COMMUNITY ID# _____
HHID#_____

KOBUK RIVER AREA

1998 SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY

* Questions marked with an asterisk are asked of all households interviewed

Community: _____
Survey Date: _____
Interviewer:_____

Household Head Name: _____
***Household Size** _____
Was household in community last year? No ____Yes____
If no, where were you living? _____
Household P.O. Box (if new): _____

***1. Did your household catch salmon for subsistence use or with a rod-and-reel this year?**
No_____ Yes_____

***2. Does your household usually subsistence fish for salmon?** No_____ Yes_____

FISHING HOUSEHOLDS ("Yes" to #1)

3. Please estimate how many salmon your household caught for subsistence use or with a rod-and-reel this year (your share of the catch if fishing with others). Include salmon you gave away, ate fresh, lost to spoilage, or obtained from helping others process fish.

CHUM_____ ("DOGS") CHINOOK_____ ("KINGS") PINK_____ ("HUMPIES") SOCKEYE _____ ("REDS") COHO_____ ("SILVERS") UNKNOWN SALMON_____

4. What type(s) of fishing gear did your household use for catching subsistence salmon this year?

SET GILL NET _____ SEINE _____
ROD-AND-REEL _____ DRIFT GILL NET _____

4a. How many salmon did your household catch and keep with rod-and-reel this year?

CHUM_____ ("DOGS") CHINOOK_____ ("KINGS") PINK_____ ("HUMPIES") SOCKEYE _____ ("REDS") COHO_____ ("SILVERS")

5. Did your household give salmon to other households this year? No _____ Yes _____

6. How was subsistence chum salmon fishing for your household this year?
____VERY GOOD _____AVERAGE _____POOR IF POOR, WHY?_____

7. Did your household catch salmon for dog food? (Using salmon for dog food is allowed by regulations.)
No ____ (Go to #13) Only backbones/heads/guts/scraps/spoiled fish ____ (Go to #13) Yes _____(Go to #8)

8. How many salmon did your household catch for dog food? (Do not include fish lost to spoilage and fed to dogs.)

CHUM_____ ("DOGS") CHINOOK_____ ("KINGS") PINK_____ ("HUMPIES") SOCKEYE _____ ("REDS") COHO_____ ("SILVERS") UNKNOWN SALMON_____

9. Were these salmon included in the estimates you already gave me? No_____ Yes _____

10. How many dogs does your household have? _____ (Go to #13)

Appendix Table G6

HHID#_____

KOBUK RIVER AREA

1998 SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY (CON'T)

NON-FISHING HOUSEHOLDS ("No" to #1)

11. Did your household help another household fish, cut or hang salmon, or process it some other way? No_____(Go to #13)
Yes _____

12. Did you receive salmon in exchange for your help? No ____ Yes ____

If yes, please estimate how many salmon you received for your household. (Do not include fish from a F&G test net.)

CHUM_____ ("DOGS") CHINOOK_____ ("KINGS") PINK_____ ("HUMPIES") SOCKEYE _____ ("REDS") COHO_____ ("SILVERS") UNKNOWN SALMON_____

(Go to #13)

COMMERCIAL FISHING

***13. Did your household commercially fish for salmon this year?** No _____ (Go to #17) Yes _____
If yes, where?_____

14. Were all of the salmon you caught when commercial fishing sold or were some brought home to eat or processed for subsistence? All sold _____ (Go to #17) Some used for subsistence _____

15. How many commercially caught salmon did your household use for subsistence?

CHUM_____ ("DOGS") CHINOOK_____ ("KINGS") PINK_____ ("HUMPIES") SOCKEYE _____ ("REDS") COHO_____ ("SILVERS") UNKNOWN SALMON_____

16. Were these salmon included in the estimates you already gave me? No _____ Yes _____

SHEEFISH AND WHITEFISH FISHING

***17. Did your household catch sheefish or whitefish for subsistence use this year?** No ____(Go to #19) Yes_____

18. Please estimate how many sheefish and whitefish your household caught for subsistence use this year (your share of the catch if fishing with others). Include fish you caught and gave away, ate fresh, lost to spoilage, or fed to dogs.

SHEEFISH _____ WHITEFISH _____

***19. Do you have any suggestions or concerns about subsistence fishing?**

THANK YOU FOR YOUR TIME AND FOR HELPING WITH THIS PROJECT.

A summary of this subsistence fishing survey will be sent to you next spring (April).

Appendix Table G7.

COMMUNITY ID# _____
HHID#_____

NOATAK RIVER AREA

1998 SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY

* Questions marked with an asterisk are asked of all households interviewed

Community: _____ Household Head Name: _____

Survey Date: _____ ***Household Size** _____

Interviewer:_____ Was household in community last year? No ____Yes____

If no, where were you living? _____

Household P.O. Box (if new): _____

***1. Did your household catch salmon for subsistence use or with a rod-and-reel this year?**
No_____ Yes_____

***2. Does your household <u>usually</u> subsistence fish for salmon?** No_____ Yes_____

FISHING HOUSEHOLDS ("Yes" to #1)

3. Please estimate how many salmon your household caught for subsistence use or with a rod-and-reel this year (your share of the catch if fishing with others). Include salmon you gave away, ate fresh, lost to spoilage, or obtained from helping others process fish.

CHUM_____ ("DOGS") CHINOOK_____ ("KINGS") PINK_____ ("HUMPIES") SOCKEYE _____ ("REDS") COHO_____ ("SILVERS") UNKNOWN SALMON_____

4. What type(s) of fishing gear did your household use for catching subsistence salmon this year?

SET GILL NET _____ SEINE _____
ROD-AND-REEL _____ DRIFT GILL NET _____

4a. How many salmon did your household catch and keep with rod-and-reel this year?

CHUM_____ ("DOGS") CHINOOK_____ ("KINGS") PINK_____ ("HUMPIES") SOCKEYE _____ ("REDS") COHO_____ ("SILVERS")

5. Did your household give salmon to other households this year? No _____ Yes _____

6. How was subsistence chum salmon fishing for your household this year?
____VERY GOOD _____AVERAGE _____POOR IF POOR, WHY?_____

7. Did your household catch salmon for dog food? (Using salmon for dog food is allowed by regulations.)
No ____ (Go to #13) Only backbones/heads/guts/scraps/spoiled fish ____ (Go to #13) Yes _____(Go to #8)

8. How many salmon did your household catch for dog food? (Do not include fish lost to spoilage and fed to dogs.)

CHUM_____ ("DOGS") CHINOOK_____ ("KINGS") PINK_____ ("HUMPIES") SOCKEYE _____ ("REDS") COHO_____ ("SILVERS") UNKNOWN SALMON_____

9. Were these salmon included in the estimates you already gave me? No_____ Yes _____

10. How many dogs does your household have? _____ (Go to #13)

Appendix Table G7.

HHID#_____

NOATAK RIVER AREA

1998 SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY (CON'T)

NON-FISHING HOUSEHOLDS ("No" to #1)

11. Did your household help another household fish, cut or hang salmon, or process it some other way? No_____(Go to #13)
Yes _____

12. Did you receive salmon in exchange for your help? No ____ Yes ____

If yes, please estimate how many salmon you received for your household. (Do not include fish from a F&G test net.)

CHUM_____ ("DOGS") CHINOOK_____ ("KINGS") PINK_____ ("HUMPIES") SOCKEYE _____ ("REDS") COHO_____ ("SILVERS") UNKNOWN SALMON_____

(Go to #13)

COMMERCIAL FISHING

***13. Did your household commercially fish for salmon this year?** No _____ (Go to #17) Yes _____
If yes, where?_____

14. Were all of the salmon you caught when commercial fishing sold or were some brought home to eat or processed for subsistence? All sold _____ (Go to #17) Some used for subsistence _____

15. How many commercially caught salmon did your household use for subsistence?
CHUM_____ ("DOGS") CHINOOK_____ ("KINGS") PINK_____ ("HUMPIES") SOCKEYE _____ ("REDS") COHO_____ ("SILVERS") UNKNOWN SALMON_____

16. Were these salmon included in the estimates you already gave me? No _____ Yes _____

TROUT (CHAR) AND WHITEFISH FISHING

***17. Did your household catch trout or whitefish for subsistence use this year?** No ____(Go to #19) Yes_____

18. Please estimate how many trout and whitefish your household caught for subsistence use this year (your share of the catch if fishing with others). Include fish you caught and gave away, ate fresh, lost to spoilage, or fed to dogs.

TROUT _____ WHITEFISH _____

***19. Do you have any suggestions or concerns about subsistence fishing?**

THANK YOU FOR YOUR TIME AND FOR HELPING WITH THIS PROJECT.

A summary of this subsistence fishing survey will be sent to you next spring (April).